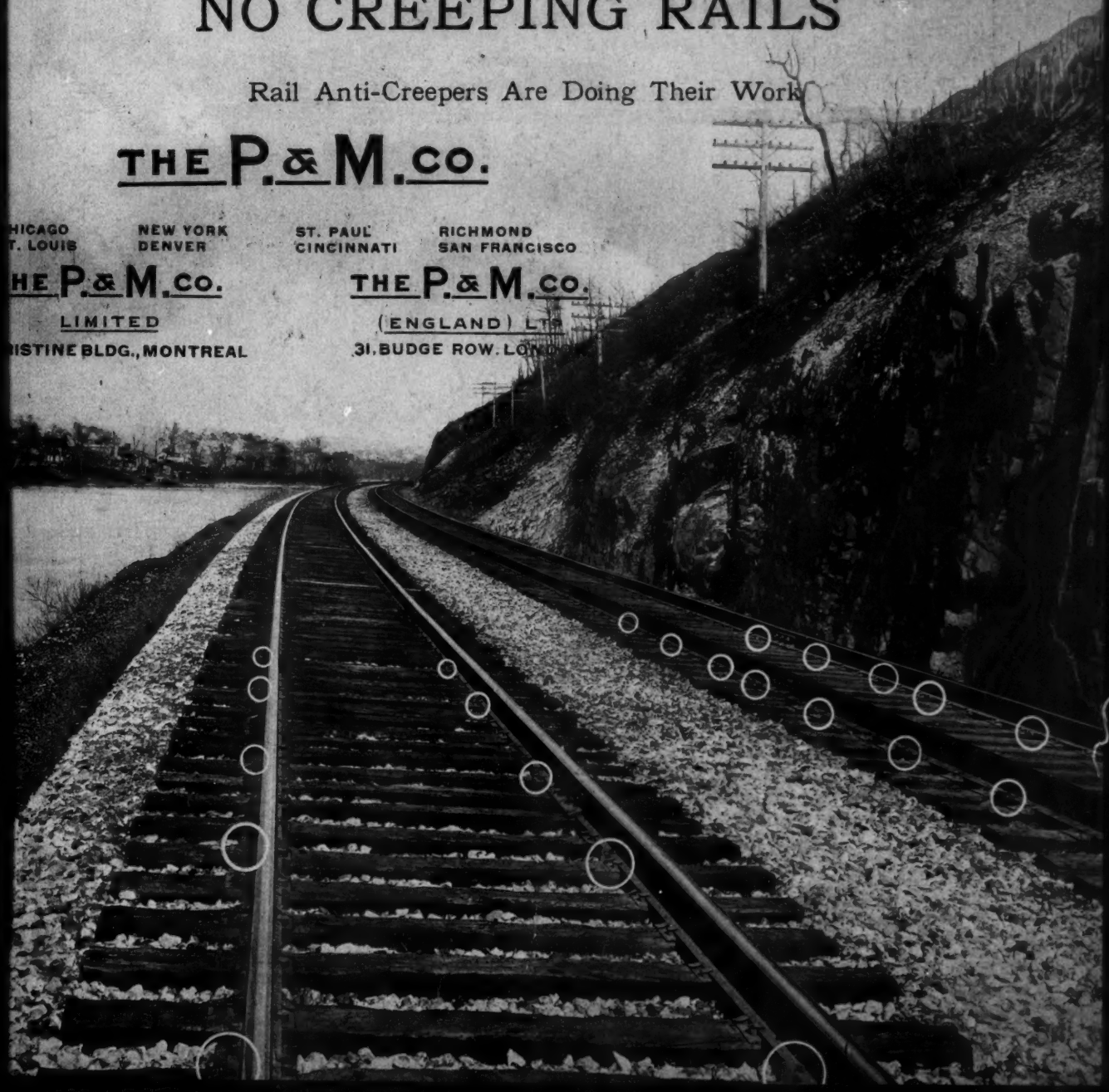
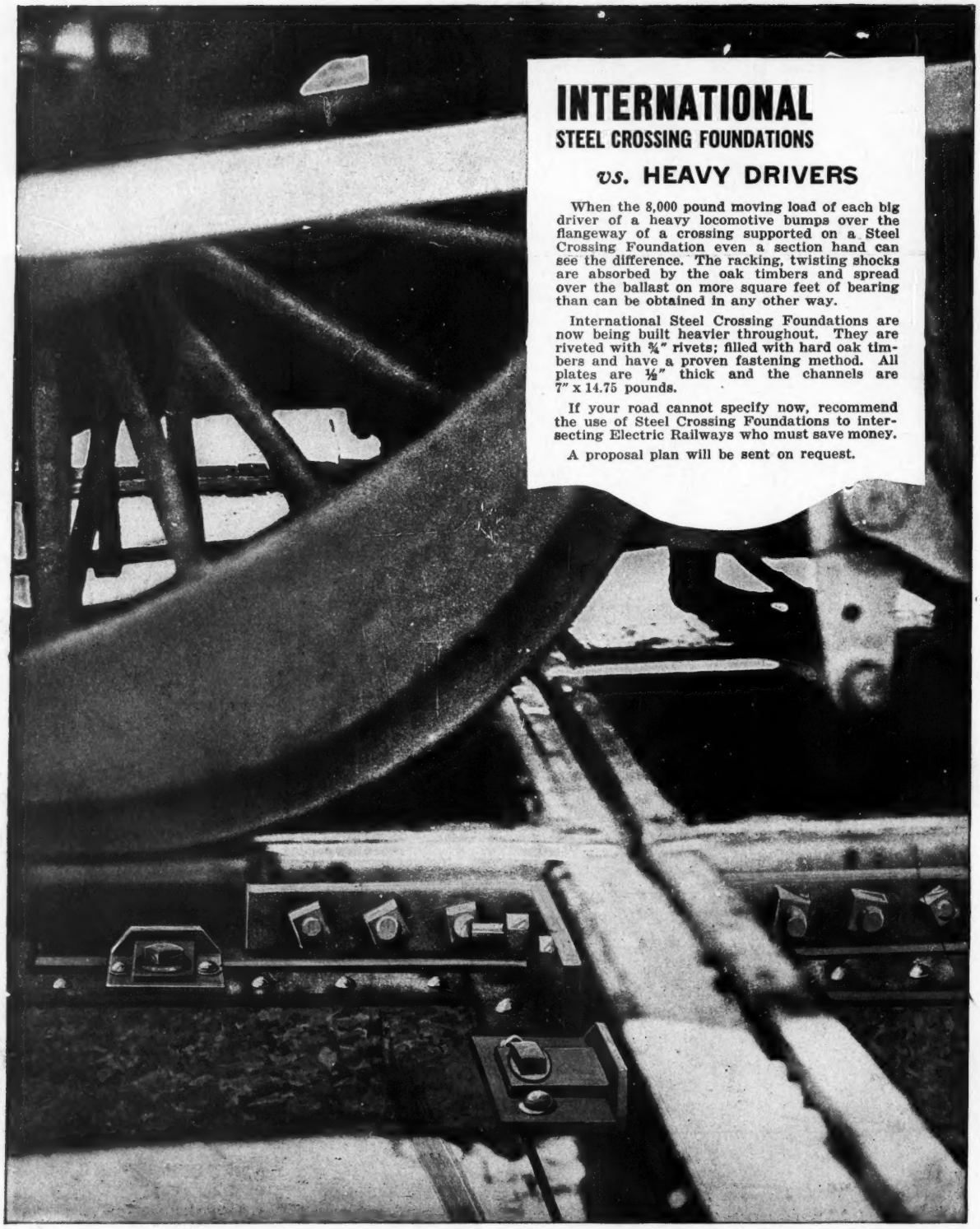
Railway Maintenance Engineer

Volume 18 CHICAGO—FEBRUARY, 1922—NEW YORK Number 2

Many Curves and Heavy Traffic
but
NO CREEPING RAILS
Rail Anti-Creepers Are Doing Their Work
THE P. & M. CO.
HICAGO NEW YORK ST. PAUL RICHMOND
T. LOUIS DENVER CINCINNATI SAN FRANCISCO
HE P. & M. CO. THE P. & M. CO.
LIMITED (ENGLAND) LTD
ISTINE BLDG., MONTREAL 31, BUDGE ROW, LON




INTERNATIONAL
STEEL CROSSING FOUNDATIONS
vs. HEAVY DRIVERS
When the 8,000 pound moving load of each big driver of a heavy locomotive bumps over the flangeway of a crossing supported on a Steel Crossing Foundation even a section hand can see the difference. The racking, twisting shocks are absorbed by the oak timbers and spread over the ballast on more square feet of bearing than can be obtained in any other way.
International Steel Crossing Foundations are now being built heavier throughout. They are riveted with ¾" rivets; filled with hard oak timbers and have a proven fastening method. All plates are ½" thick and the channels are 7" x 14.75 pounds.
If your road cannot specify now, recommend the use of Steel Crossing Foundations to intersecting Electric Railways who must save money.
A proposal plan will be sent on request.

The International Steel Tie Company

CLEVELAND, OHIO

RAILWAY MAINTENANCE ENGINEER
Entered as second-class matter June 23, 1916, at the post office at Chicago, Ill., under the Act of March 3, 1879. Published Monthly by Simmons-Boardman Publishing Company at 608 S. Dearborn St., Chicago. Subscription price, United States, Canada and Mexico, $2.00 a year; foreign countries, $3.00 a year.

Alphabetical Index to Advertisements, Page 5 Classified Index of Advertisers, Pages 5 and 6

INLAND STEEL

Standard Section Tee Rails will be produced at our Indiana Harbor Works from Basic Open Hearth Steel, commencing March, 1922.

Inland quality control from raw materials through final inspection insures maximum safety.

TRACK ACCESSORIES

Splice Bars—Heat Treated
Tie Plates
Track Bolts—Heat Treated
Track Spikes

INLAND
BASIC OPEN HEARTH
STEEL PRODUCTS

BILLETS BARS PLATES SHAPES SHEETS

INLAND STEEL COMPANY

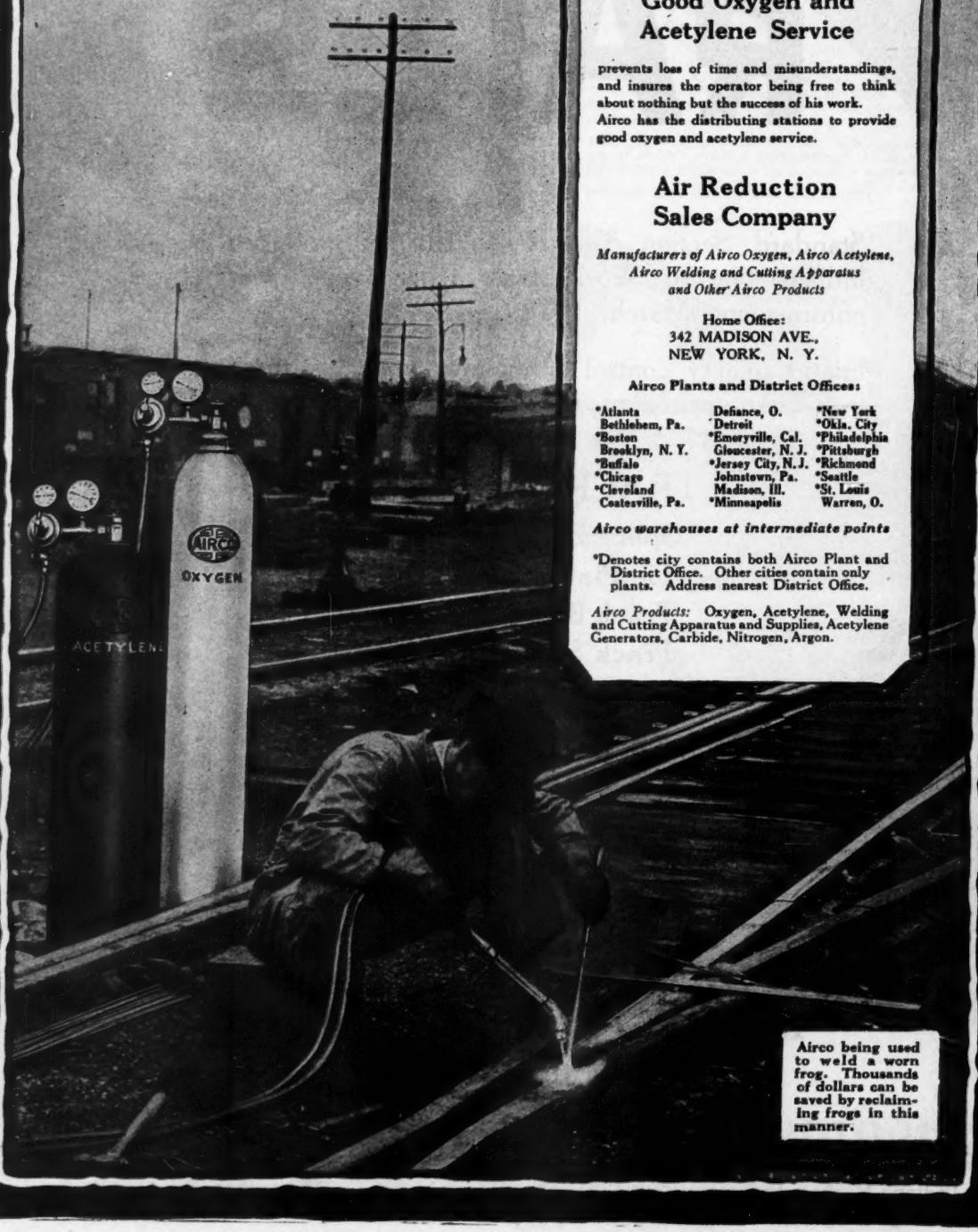
38 South Dearborn St., Chicago

Works:
Indiana Harbor, Ind.
Chicago Heights, Ill.

Branch Offices:
Milwaukee, Wis. St. Louis, Mo.
St. Paul, Minn.

AIRCO OXYGEN AND ACETYLENE SERVICE

IS GOOD SERVICE



AIRCO

Good Oxygen and Acetylene Service

prevents loss of time and misunderstandings, and insures the operator being free to think about nothing but the success of his work. Airco has the distributing stations to provide good oxygen and acetylene service.

Air Reduction Sales Company

Manufacturers of Airco Oxygen, Airco Acetylene, Airco Welding and Cutting Apparatus and Other Airco Products

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NEW YORK, N. Y.

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*Chicago	Johnstown, Pa.	*Seattle
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*Denotes city contains both Airco Plant and District Office. Other cities contain only plants. Address nearest District Office.

Airco Products: Oxygen, Acetylene, Welding and Cutting Apparatus and Supplies, Acetylene Generators, Carbide, Nitrogen, Argon.

Airco being used to weld a worn frog. Thousands of dollars can be saved by reclaiming frogs in this manner.

Send for the Airco Frog Welding Booklet entitled, "An Airco Achievement." Mention Railway Maintenance Engineer when writing.

ALPHABETICAL INDEX TO ADVERTISEMENTS

A

Air Reduction Co., Inc..... 4
American Casting Co. 23
American Chain Co., Inc..... 11
American Hoist & Derrick Co..... 16
American Saw Mill Machinery Co.. 14
American Valve and Meter Co..... 8
American Well Works..... 9
Armco Culvert and Flume Mfrs. Assn. 7
Armor Oil and Chemical Co..... 12

B

Bethlehem Steel Company..... 21

D

Diamond State Fibre Co..... 10

F

Fairbanks, Morse & Co..... 16
Fairmont Gas Engine and Ry. Motor Car Co. 14
Frog, Switch and Manufacturing Co. 23

G

Golden-Anderson Valve Specialty Co. 24
Goulds Manufacturing Co., The.... 12

H

Headley Good Roads Co..... 21

I

Ingersoll-Rand Co. 15
Inland Steel Company 3
International Steel Tie Co..... 2

L

Lundie Engineering Corp..... 20

M

Massey Concrete Products Corp... 12

N

National Lock Washer Co., The... 25
New Jersey Zinc Co., The..... 18

P

P. and M. Co., The..... 1
Pittsburgh-Des Moines Steel Co... 10

R

Rail Joint Co. 20
Ramapo Iron Works 23
Republic Creosoting Co. 13
Ruberoid Co., The..... 21

S

St. Louis Frog and Switch Co.... 23
Sullivan Machinery Co..... 20

V

Verona Tool Works 26

W

Weir Frog Co..... 24
Wharton & Co., Wm., Jr..... 24
Wood Shovel and Tool Co., The... 19

CLASSIFIED INDEX OF ADVERTISERS

Acetylene, Dissolved.
Air Reduction Co., Inc.

Adjustable Rail Clamps.
Wm. Wharton, Jr., & Co.

Air Compressors.
Fairbanks, Morse & Co.
Ingersoll-Rand Co.
Sullivan Machinery Co.

Air Hoists.
Ingersoll-Rand Co.

Air-Lift Pumping Systems.
Ingersoll-Rand Co.
Sullivan Machinery Co.

Anchors.
P. & M. Co., The

Anti-Creepers.
P. & M. Co., The.

Apparatus, Brazing, Welding and Cutting, Heat Treatment.
Air Reduction Co., Inc.

Argon.
Air Reduction Co., Inc.

Asphalt.
Ruberoid Co., The.

Asphalt Shingles.
Ruberoid Co., The.

Automatic Pump Starters.
Golden-Anderson Valve Specialty Co.

Automatic Valves.
Golden-Anderson Valve Specialty Co.

Barges and Hulls.
Des Moines Bridge & Iron Co.
Pittsburgh-Des Moines Steel Co.

Barrels.
Diamond State Fibre Co.

Bars.
Bethlehem Steel Company.

Benders, Rail.
American Chain Co., Inc.
Q. & C. Company.
Verona Tool Works.

Billets.
Bethlehem Steel Company.

Blasting Powders.
E. I. du Pont de Nemours & Co.

Blasting Supplies.
E. I. du Pont de Nemours & Co.

Blow Pipes, Oxy-Acetylene.
Air Reduction Co., Inc.

Bolts.
Bethlehem Steel Company.

Bond Wire.
Armco Culvert & Flume Mfrs. Assn.

Brazing.
Air Reduction Co., Inc.

Buildings.
Des Moines Bridge & Iron Co.
Pittsburgh-Des Moines Steel Co.

Building Papers.
Ruberoid Co., The

Burners, Bunsen, Acetylene.
Air Reduction Co., Inc.

Calcium Carbide.
Air Reduction Co., Inc.

Cars, Motor, Inspection.
Fairbanks, Morse & Co.
Fairmont Gas Engine & Ry. Motor Car Co.

Cars, Motor, Section.
Fairbanks, Morse & Co.
Fairmont Gas Engine & Ry. Motor Car Co.

Cars, Velocipede.
Fairbanks, Morse & Co.
Fairmont Gas Engine & Ry. Motor Car Co.

Castings.
Bethlehem Steel Company.

Cattle Guards.
Fairbanks, Morse & Co.

Cattle Passes.
Massey Concrete Prod. Corp.

Clutch Linings.
Diamond State Fibre Co.

Coaling Stations.
Des Moines Bridge & Iron Co.
Fairbanks, Morse & Co.
Pittsburgh-Des Moines Steel Co.

Compromise Joints.
Bethlehem Steel Company.

Conduits.
Diamond State Fibre Co.

Corrugated Iron.
Armco Culvert & Flume Mfrs. Assn.

Cranes, Wrecking.
Bucyrus Company.

Creosote Oil.
Republic Creosoting Co.

Crossings, Highway Bituminous.
Headley Good Roads Co.

Crossings.
Bethlehem Steel Company.
St. Louis Frog & Switch Co.
Weir Frog Co.
Wm. Wharton, Jr., & Co.

Crossing Foundations.
International Steel Tie Co.

Culverts.
Armco Culvert & Flume Mfrs. Assn.

Culvert Pipe, Cast Iron.
American Casting Co.

Culvert Pipe, Concrete.
Massey Concrete Prod. Corp.

Curbing.
Massey Concrete Prod. Corp.

Cutting, Oxy-Acetylene.
Air Reduction Co., Inc.

Derails.
American Chain Co., Inc.
Q. & C. Company.
Wm. Wharton, Jr., & Co.

Ditchers.
American Hoist & Derrick Co.
Bucyrus Company.

Dynamite.
E. I. du Pont de Nemours & Co.

Dredges.
Bucyrus Company.
Des Moines Bridge & Iron Co.
Pittsburgh-Des Moines Steel Co.

Drop Forgings.
Bethlehem Steel Company.

Engines.
Fairbanks, Morse & Co.

Electric Light & Power Plants.
Fairbanks, Morse & Co.

Electric Valves.
Golden - Anderson Valve Specialty Co.

Engines.
Fairmont Gas Engine & Ry. Motor Car Co.

Engines, Hand Car.
Fairbanks, Morse & Co.
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Excavators.
Bucyrus Company.

Explosives.
E. I. du Pont de Nemours & Co.

Fans.
Fairbanks, Morse & Co.
Fairmont Gas Engine & Ry. Motor Car Co.

Fence Posts.
Chicago Steel Post Co.
Massey Concrete Prod. Corp.

Fibre, Insulating.
Q. & C. Company.

Flangers, Snow.
Q. & C. Company.

Float Valves.
American Valve & Meter Co.
Golden - Anderson Valve Specialty Co.

Forgings.
Bethlehem Steel Company.

MAINTENANCE OF WAY—BUYERS' GUIDE

Forge Hammers.
Sullivan Machinery Co.

Frogs.
Bethlehem Steel Company.
Frog, Switch & Mfg. Co.
Ramapo Iron Works.
St. Louis Frog & Switch Co.
Weir Frog Co.
Wm. Wharton, Jr., & Co.

Gages, Pressure, Gas.
Air Reduction Co., Inc.

Gas, Acetylene.
Air Reduction Co., Inc.

Gears.
Diamond State Fibre Co.

Generators, Acetylene.
Air Reduction Co., Inc.

Girder Rail.
Bethlehem Steel Company.

Graphite.
Jos. Dixon Crucible Co.

Grinders (Portable).
Ingersoll-Rand Co.

Guard Rails.
Bethlehem Steel Company.
Ramapo Iron Works.
Wm. Wharton, Jr., & Co.

Guard Rail Clamps.
American Chain Co., Inc.
Q. & C. Company.
Ramapo Iron Works.
Weir Frog Co.

Hand Cars.
Fairbanks, Morse & Co.

Hand Car Engines.
Fairmont Gas Engine & Ry. Motor Car Co.

Hammer Drills.
Sullivan Machinery Co.

High Tee Rail.
Bethlehem Steel Company.

Hoists.
Fairbanks, Morse & Co.

Insulated Rail Joints.
Rail Joint Co.

Junction Boxes.
Massey Concrete Prod. Corp.

Jacks.
Duff Manufacturing Co.
Fairbanks, Morse & Co.
Verona Tool Works.

Lubricants.
Jos. Dixon Crucible Co.

Machinery.
Bethlehem Steel Company.

Machinery, Gas Producers.
Air Reduction Co., Inc.

Manganese Track Work.
Bethlehem Steel Company.
Ramapo Iron Works.
Wm. Wharton, Jr., & Co.

Manholes.
Massey Concrete Prod. Corp.

Markers.
Massey Concrete Prod. Corp.

Mile Posts.
Massey Concrete Prod. Corp.

Motor Cars.
Fairbanks, Morse & Co.
Fairmont Gas Engine & Ry. Motor Car Co.

Nitrogen.
Air Reduction Co., Inc.

Nut Locks.
National Lock Washer Co.

Nuts.
Bethlehem Steel Company.

Oil Engines.
Bethlehem Steel Company.
Fairbanks, Morse & Co.
Ingersoll-Rand Co.

Oil Houses.
Massey Concrete Prod. Corp.

Ordnance.
Bethlehem Steel Company.

Out Houses.
Massey Concrete Prod. Corp.

Outfit, Welding.
Air Reduction Co., Inc.

Oxygen.
Air Reduction Co., Inc.

Paints.
Armor Oil & Chemical Co.
Jos. Dixon Crucible Co.
New Jersey Zinc Co.
Ruberoid Co., The.

Pencils.
Jos. Dixon Crucible Co.

Penstocks.
American Valve & Meter Co.

Pig Iron.
Bethlehem Steel Company.

Pile Drivers.
Bucyrus Company.

Piling.
Massey Concrete Prod. Corp.

Pinions.
Diamond State Fibre Co.

Pipe, Cast Iron.
American Casting Co.

Pipe, Concrete.
Massey Concrete Prod. Corp.

Pipe Carriers.
Massey Concrete Prod. Corp.

Pipe Joint Compound.
Jos. Dixon Crucible Co.
Ruberoid Co., The.

Pipe, Riveted Steel.
Des Moines Bridge & Iron Co.
Pittsburgh-Des Moines Steel Co.

Plants, Welding and Cutting.
Air Reduction Co., Inc.

Pneumatic Tie Tampers.
Ingersoll-Rand Co.

Poles, Concrete.
Massey Concrete Prod. Corp.

Powders.
E. I. du Pont de Nemours & Co.

Power Houses.
Massey Concrete Prod. Corp.

Preservative, Timber.
New Jersey Zinc Co.

Producers, Gas.
Air Reduction Co., Inc.

Pumps.
American Well Works.
Fairbanks, Morse & Co.
Ingersoll-Rand Co.
Sullivan Machinery Co.

Push Cars.
Fairbanks, Morse & Co.

Rails.
Inland Steel Company.

Rail Anchors.
P. & M. Co., The.

Rail Anti-Creepers.
P. & M. Co., The

Rail Benders.
Fairbanks, Morse & Co.
Q. & C. Company.

Rail Braces.
Bethlehem Steel Company.
Q. & C. Company.
Ramapo Iron Works.
Weir Frog Co.

Rail Joints.
American Chain Co., Inc.
Q. & C. Company.
Rail Joint Co.
Wm. Wharton, Jr., & Co.

Rail Saws.
Fairbanks, Morse & Co.
Q. & C. Company.

Rare Gases.
Air Reduction Co., Inc.

Regulators, Oxy-Acetylene.
Air Reduction Co., Inc.

Replacers, Car.
American Chain Co., Inc.
Q. & C. Company.

Riveting Hammers.
Ingersoll-Rand Co.
Verona Tool Works.

Rivets.
Bethlehem Steel Company.

Rock Drills.
Ingersoll-Rand Co.
Sullivan Machinery Co.
Verona Tool Works.

Rods, Welding.
Air Reduction Co., Inc.

Roof Slabs.
Fairbanks, Morse & Co.
Massey Concrete Prod. Corp.

Roofing and Siding.
Fairbanks, Morse & Co.

Saw Mills.
American Saw Mill Machinery Co.

Screw Spike Drivers.
Ingersoll-Rand Co.

Sewer Pipe.
American Casting Co.
Massey Concrete Prod. Corp.

Sewer Pipe Seal Compound.
Ruberoid Co., The.

Sheets, Fibre.
Diamond State Fibre Co.

Sheet Iron.
Armco Culvert & Flume Mfrs. Assn.

Sheet Steel.
Inland Steel Company.

Shovels.
Wood Shovel and Tool Co., The.

Signal Foundations, Concrete.
Massey Concrete Prod. Corp.

Skid Shoes.
Q. & C. Company.

Slabs, Concrete.
Massey Concrete Prod. Corp.

Smoke Stacks.
Des Moines Bridge & Iron Co.
Massey Concrete Prod. Corp.
Pittsburgh-Des Moines Steel Co.

Snow Melting Devices.
Q. & C. Company.

Snow Plows.
Q. & C. Company.

Spikes.
Bethlehem Steel Company.

Spreader Plows.
Bucyrus Company.

Standard Tee Rails.
Bethlehem Steel Company.

Standpipes.
American Valve & Meter Co.
Des Moines Bridge & Iron Co.
Fairbanks, Morse & Co.
Pittsburgh-Des Moines Steel Co.

Station Houses.
Massey Concrete Prod. Corp.

Steam Shovels.
American Hoist & Derrick Co.
Bucyrus Company.

Steel Plates and Shapes.
Bethlehem Steel Company.
Des Moines Bridge & Iron Co.
Pittsburgh-Des Moines Steel Co.

Steel Posts.
Chicago Steel Post Co.

Steel Shovels.
Wood Shovel and Tool Co., The.

Steel Ties.
International Steel Tie Co.

Step Joints.
American Chain Co., Inc.
Q. & C. Company.
Rail Joint Co.

Storage Tanks.
Des Moines Bridge & Iron Co.
Pittsburgh-Des Moines Steel Co.

Street Railway Special Work.
Bethlehem Steel Company.

Structural Steel.
Bethlehem Steel Company.
Inland Steel Company.

Switches.
Bethlehem Steel Company.
Frog, Switch & Mfg. Co.
Ramapo Iron Works.
St. Louis Frog & Switch Co.
Weir Frog Co.
Wm. Wharton, Jr., & Co.

Switch Locks.
American Valve & Meter Co.

Switchmen's Houses.
Massey Concrete Prod. Corp.

Switch Stands.
Wm. Wharton, Jr., & Co.

Switchstands and Fixtures.
American Valve & Meter Co.
Bethlehem Steel Company.
Fairbanks, Morse & Co.
Ramapo Iron Works.
Weir Frog Co.

Tampers.
Ingersoll-Rand Co.

Tanks.
Des Moines Bridge & Iron Co.
Fairbanks, Morse & Co.
Pittsburgh-Des Moines Steel Co.

Tank Valves.
American Valve & Meter Co.

Telegraph Poles.
Massey Concrete Prod. Corp.

Telephone Booths.
Massey Concrete Prod. Corp.

Tie Plates.
Bethlehem Steel Company.
Inland Steel Company.
Lundie Engineering Corp.

Tie Plate Clamps.
Q. & C. Company.

Tie Rods.
Bethlehem Steel Company.

Tie Spacers.
American Chain Co., Inc.

Tin Plate.
Bethlehem Steel Company.

Tongue Switches.
Bethlehem Steel Company.

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Air Reduction Co., Inc.

Torches, Blow Combination.
Air Reduction Co., Inc.

Torches, Welding Acetylene.
Air Reduction Co., Inc.

Torches, Welding and Cutting.
Air Reduction Co., Inc.

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Fairbanks, Morse & Co.

Track Insulation.
Diamond State Fibre Co.

Track Jacks.
Verona Tool Works.

Track Material.
Inland Steel Company.
Ramapo Iron Works.
Weir Frog Co.

Track Pans.
Des Moines Bridge & Iron Co.
Pittsburgh-Des Moines Steel Co.

Track Scales.
Fairbanks, Morse & Co.

Track Tools.
Fairbanks, Morse & Co.
Q. & C. Company.
Verona Tool Works.

Trestle Slabs.
Massey Concrete Prod. Corp.

Valves.
Golden-Anderson Valve Specialty Co.

Varnish, Electrical Insulating.
Ruberoid Co., The.

Washers.
Diamond State Fibre Co.

Water Column.
American Valve & Meter Co.

Waterproofing.
Ruberoid Co., The.

Water Regulating Valves.
Golden-Anderson Valve Specialty Co.

Water Tanks.
Des Moines Bridge & Iron Co.
Pittsburgh-Des Moines Steel Co.

Welding, Oxy-Acetylene.
Air Reduction Co., Inc.

Wheels (Hand and Motor Car).
Fairmont Gas Engine & Ry. Motor Car Co.

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Armco Culvert & Flume Mfrs. Assn.

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Fairbanks, Morse & Co.

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Republic Creosoting Co.

Wood Working Machinery.
American Saw Mill Machinery Co.

Wrecking Cranes.
Bucyrus Company.

Zinc Chloride.
New Jersey Zinc Co.

THE HAMMER OF TRAFFIC

Where it is necessary or desirable for a culvert to be installed under a shallow fill, it is important that it shall have sufficient elasticity to take up the shock of successive vibrations without injury. ARMCO Culverts are Elastic.

For twelve years, the ARMCO culvert seen in the picture under the tracks of the Atlanta, Georgia, Terminal has received the hammer and vibration of a hundred trains a day every day in the year. The impact is almost direct, because the cushion or fill between the ties and culvert is only a few inches thick. Yet a very critical examination showed that it had never been permanently deformed in any way; that after these many years of service it still maintained a true circular cross-section throughout its entire length.

The hammer of traffic is particularly well met by the ARMCO Culverts. Their elasticity permits them to be slightly deformed without permanent injury. In other words, they absorb the ordinary shocks and vibrations without injury and without losing their original shape. Experience, of which the above picture is but one instance, has proven that ARMCO culverts can be placed near the surface and give efficient, durable service.

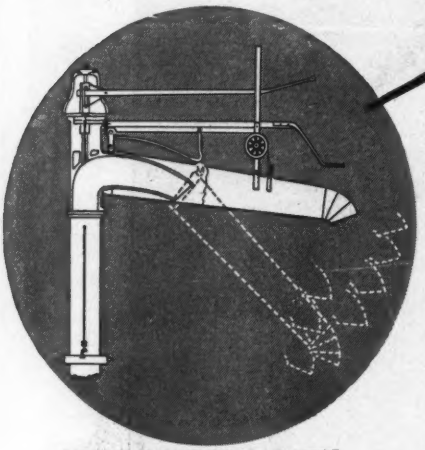
There is a manufacturer in nearly every state, and in Canada, making genuine rust-resisting ARMCO CULVERTS and other products of Armco Ingot Iron such as flumes, siphons, tanks, road signs, roofing, etc. Write for full information and nearest shipping point on products in which you are interested.

ARMCO Ingot Iron

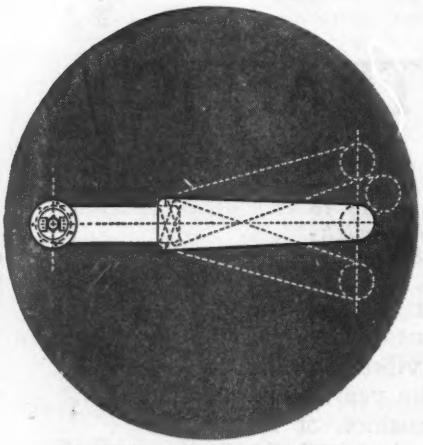
ARMCO CULVERT & FLUME MFGRS. ASSN.

215 NORTH MICHIGAN AVE. CHICAGO, ILL.

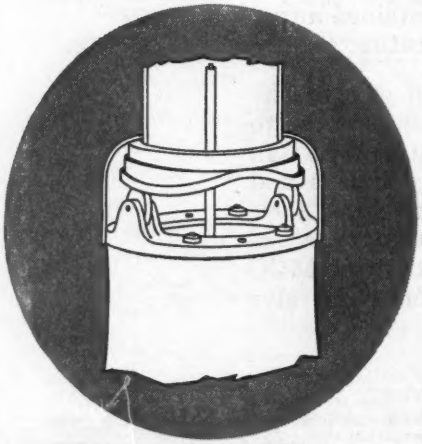
ARMCO Ingot Iron



SHOWING VERTICAL RANGE FENNER DROP SPOUT



SHOWING LATERAL RANGE FENNER DROP SPOUT



GRAVITY TURNING & LOCKING DEVICE

Its Quicker-Easier-Safer

to fill your tender tanks with

POAGE *Style* "H" WATER COLUMN

Equipped with

Fenner Drop Spout

Quicker and Easier because the spout can be instantly brought into play without accurately spotting the tender. It works equally well with tenders of different heights. The spout has a vertical range of five feet and a lateral range of three.

The spout is non-freezable. Heavy icicles will not gather upon it. There is no packing at the open telescopic joint, yet, it does not leak a drop of water.

Safer—as soon as it is released the spout swings by gravity to a position parallel with the track and remains there locked. There are no unsafe locking devices to be operated.

The three foot lateral range of the spout prevents the column being tipped over if the tender shifts unexpectedly.

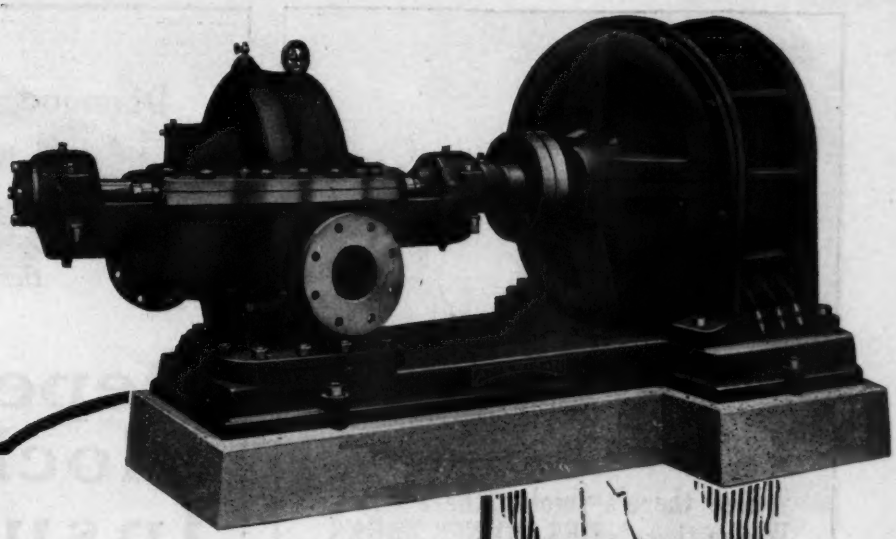
There is no danger of water hammer bursting the mains. The Poage Style H valve shuts off 85 per cent of the flow very quickly and the remaining 15 per cent more slowly—the correct principle to secure quick closure without water hammer.

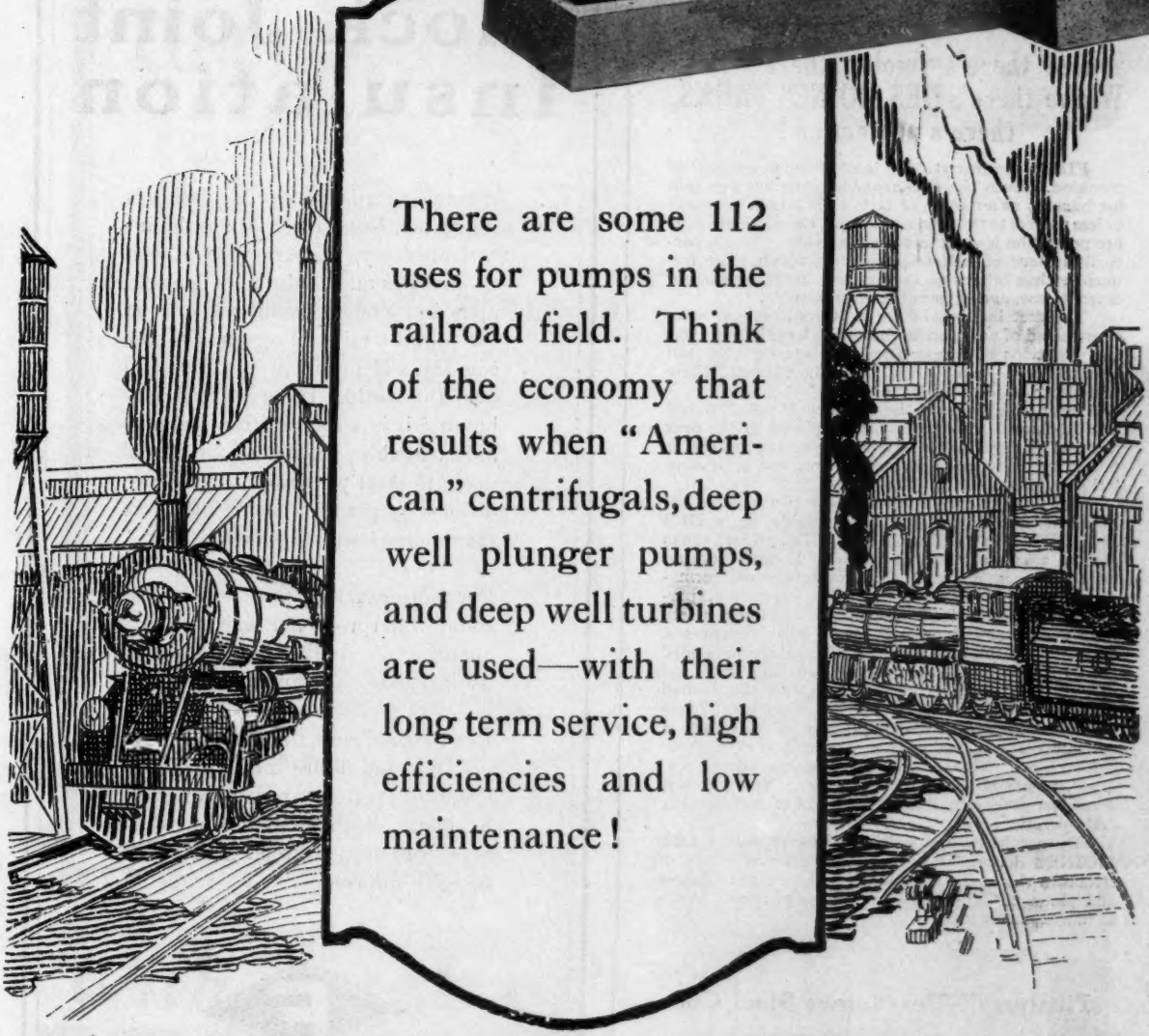
Try the Poage Style H Water Column—It's better.

MANUFACTURED EXCLUSIVELY BY

The AMERICAN VALVE & METER COMPANY

CINCINNATI, O.





There are some 112 uses for pumps in the railroad field. Think of the economy that results when "American" centrifugals, deep well plunger pumps, and deep well turbines are used—with their long term service, high efficiencies and low maintenance!

THE AMERICAN WELL WORKS

General Office and Works
AURORA, ILL.

Chicago Office
FIRST NATIONAL BANK BLDG.

Where there's smoke, there's fire; Where there's DES MOINES TANKS, there's protection!

FIRE!—destructive fire is a "common enemy" of mankind. Even the ***fire-proof*** building has a certain fire hazard; as a matter of fact, all buildings are more or less subject to this common enemy, therefore, efficient fire protection is an economical necessity. This is particularly true of industrial buildings which, more frequently than otherwise, are situated on the outskirts of cities, towns, and even in the open country.

The first industrial "fire protection tanks" were constructed of wood, somewhat like a large barrel. But the variations of temperature—the freezing cold and burning heat—made them very short-lived. There were other disadvantages too!

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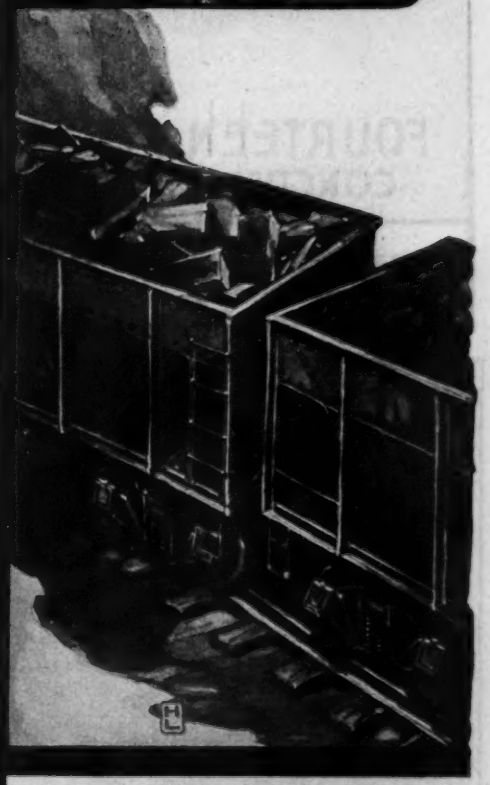

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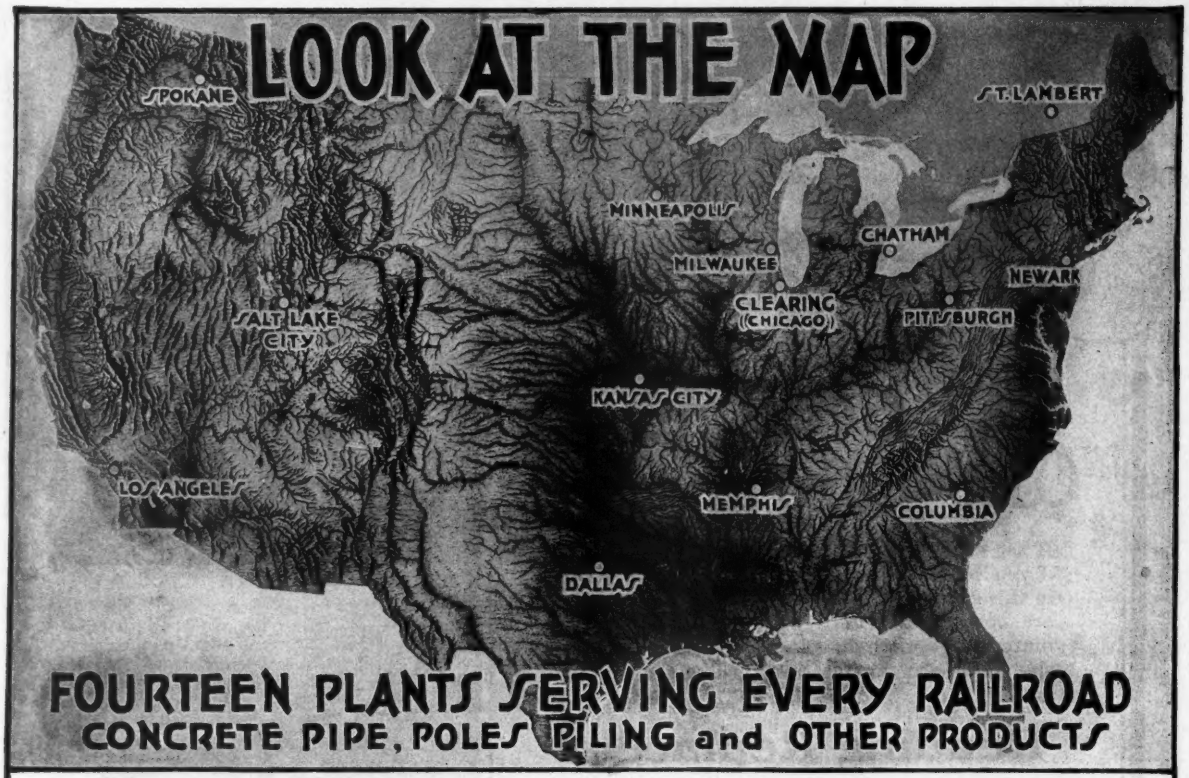

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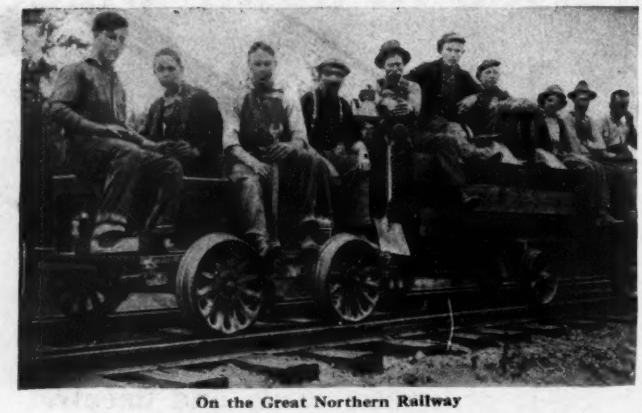

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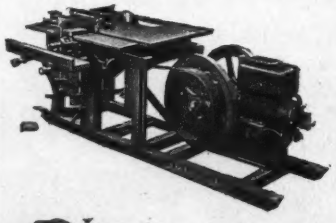

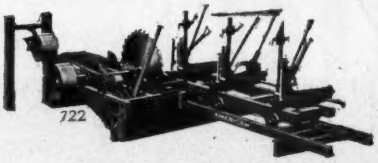

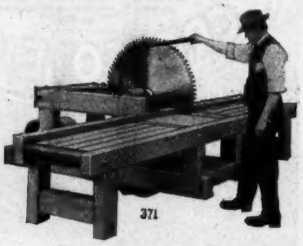

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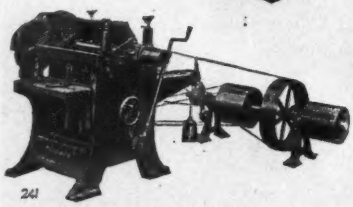

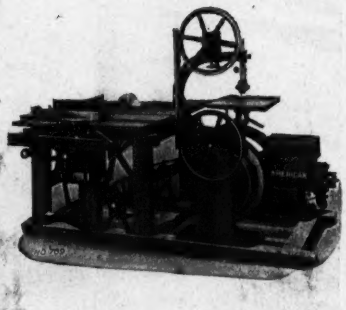

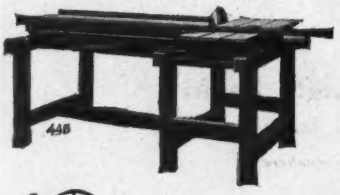

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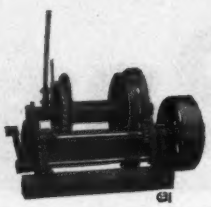

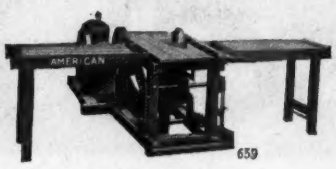

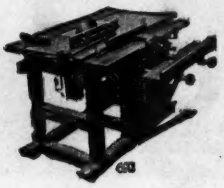

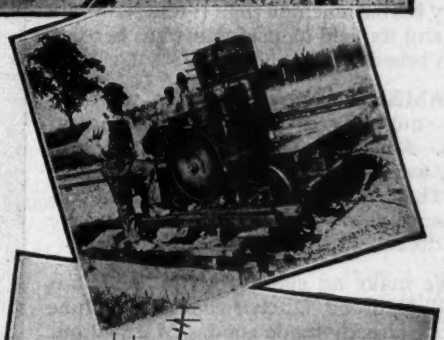

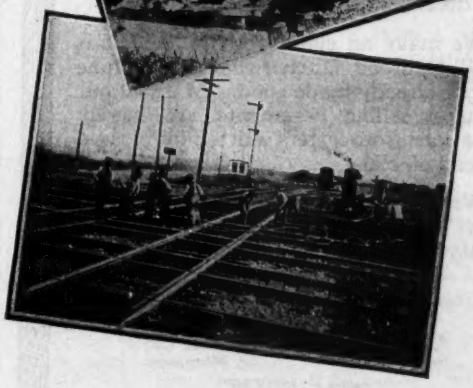

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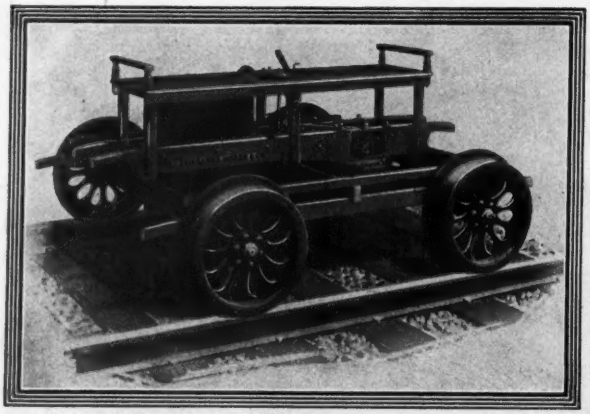

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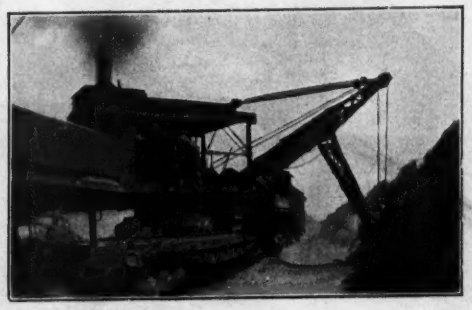

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Railway Maintenance Engineer

Vol. 19 February, 1922 Number 2

TABLE OF CONTENTS

EDITORIALS 41

LETTERS TO THE EDITOR 43

A LONG EXPERIENCE WITH CREOSOTED TIMBER ON THE SANTA FE; A. F. ROBINSON 44

THE EMPLOYER IS ALWAYS LOOKING FOR MEN HE CAN PROMOTE; WALTER S. LACHER 47

PICK THE SEASON FOR THE WORK; J. M. GARDNER 48

GETTING THE MAXIMUM PERFORMANCE OUT OF LOCOMOTIVE CRANES 49

TIE PRODUCTION IS NOW TWENTY-FIVE PER CENT OF NORMAL 54

TRACK INSPECTION AWARDS ON THE D. L. & W. AND THE ERIE 56

TIMBER TREATMENT PROMOTES ECONOMY IN MAINTENANCE OF WAY 57

BUILDING UP RAIL ENDS WITH THE GAS TORCH 61

THE CREOSOTED POSTS DID NOT BURN 62

RAILWAY AFFAIRS AT THE NATIONAL CAPITAL 63

ACTIVITIES OF THE RAILROAD LABOR BOARD 64

ORGANIZING FOR WINTER WORK IN THE BOSTON TERMINALS; JOHN TALBOT 66

WHAT'S THE ANSWER? 67

SOFTENING WATER ON THE SANTA MARIA; K. B. HOLEMAN 71

HEAVY SNOW TIES UP RAIL TRAFFIC INTO WASHINGTON 72

NEW DEVICES 73

ASSOCIATION ACTIVITIES 75

THE MATERIAL MARKET 75

GENERAL NEWS 76

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How battered rail ends may be built up?
How cut ends of treated piles may be protected from decay?
How ties should be peeled and by whom?
How ties are produced and marketed?

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Railway Maintenance Engineer

Making Progress During the Winter

While we are now in the midst of winter and most gangs are cut down to the minimum, the resourceful foreman can still do much constructive work and get it out of the way of the spring and summer rush if he will make the most of his opportunities. It is true that the weather may be adverse, and it is difficult to accomplish results with a small force. However, it is the common observation that because of these handicaps the average gang is not directed with the same degree of efficiency during the winter as during the summer when there is a greater pressure for results. With a force sufficient to meet the emergencies of winter maintenance there is of necessity considerable slack time at intervals which can be utilized to advantage in performing certain operations which can be done almost if not equally as well during the winter. Any work of this character which can be completed during the winter is that much additional return for the money which must be spent in any event to maintain the minimum force. The initiative in work of this character rests with the local supervisors and foremen.

A Problem of Conduct

This is the time of the year when railway tracks in cities and even in small towns are being invaded daily by women and children for the purpose of picking up scattered coal. In the large cities the railroads provide police whose duties include the dispersing of these coal pickers. But in the smaller towns this duty falls largely on the section foreman and other railway employees who are regularly employed on the property. In large measure, this duty is moral rather than mandatory. The presence of women and children on tracks introduces a grievous hazard and is a potential source of pilfering. The railroad man realizes that trespassing of this kind constitutes a real danger and that the coal pickers should be driven away. On the other hand, he knows that many of them come from poor families, who are probably sorely in need of the fuel and that in the case of children they are doing this work under compulsion. This, however, does not give him any justification for leniency in permitting this form of trespass. It is better that many shall be denied the use of the waste coal than one child should be maimed.

Preservation Means Conservation

America has been a land of plenty; the pioneer found abundant natural resources on every hand; the forests were so plentiful as to constitute a hindrance to his efforts to wrest a living from the soil and in consequence he was exceedingly wasteful with what nature gave him. But conditions have changed. Our resources can no longer be considered unlimited. Our forests are rapidly being depleted. Yet the average American does not look on a stick of wood with much more care than he did when it was plentiful. This explains the lack of interest which many manifest when the problem of timber preservation is being discussed. It also explains, in a measure, the lack of care exercised to avoid the use of lumber in ways that encourage its mechanical destruction or decay. The problem is one of education and because of the enormous amount of lumber used annually by the railroads in various forms, much of the effort to instill a knowledge of the value of timber and the need for its conservation should be directed toward the employees and their officers. This means that not only should they be taught the benefits to be derived from preservative processes, but that the timber, after being treated, should be cared for.

The Value of Small Economies

The operations of a railway are so varied, the number of men employed is so large and they are scattered over such a wide area that adequate supervision is difficult to secure. This condition applies particularly to the maintenance of way department, whose forces are scattered in small gangs over the entire road. For the same reasons the dangers of waste and loss are increased greatly, while the opportunities for effecting economies are correspondingly increased. These economies are possible only by the co-operation of every man and particularly of every foreman and supervisor in direct charge of the men. While the individual savings of one man or one gang may appear small in themselves, when they are multiplied by the number on the entire system the total looms large. This is illustrated by the results of a campaign which was inaugurated by the Illinois Central last spring to reduce and to hold the investment in small tools, except shovels, to the minimum. As a result of bringing this matter to the attention of the roadmasters and through them to the foremen, the expenditure for small tools for the first four months of 1921 was decreased 40.2 per cent, representing a saving of $54,457.32. Surely a saving such as this is worth while, particularly when it can be effected through the elimination of waste and without any reduction in efficiency or in the standards of maintenance.

The Secret of His Success

Whenever observations are made of the activities and accomplishments of men in responsible charge of maintenance work, some men are always to be found engaged in practically identical work carried on under similar conditions, who, while seemingly displaying no more intelligence or exerting no more effort, carry on their work with less difficulty than others and perhaps even accomplish more. Take, for instance, two roadmasters of fairly equal ability, each of whom has under his jurisdiction a similar territory with practically an equal number of gangs. Each of these roadmasters is observed to go over his division in much the same way, to spend about the same amount of time with his foremen and to outline the work in a similar fashion. There is about as much work to be done on one division as the other and each man seemingly puts forth equal effort. And yet it develops that one man experiences much more trouble in getting his work done than the other. The question quite naturally arises, "What is the secret of his success?" Other things being equal, is it not a system of working which embodies as one of its predominating features the practice of following up instructions methodically until the work is done? In the case of the more successful of the two roadmasters is he not to be found one day telling his foreman about a rough spot in his track, for instance, and then inquiring within a reasonable time thereafter regarding the progress made in correcting the trouble, and continuing his inquiries until the matter is corrected? This is the observation usually to be made of efficient

officers, the result of this practice of following up being that the men themselves realize that the instructions they receive are not merely given as a matter of form to be forgotten or neglected immediately upon their officers' departure, but are rather instructions which their officers expect to be heeded. Because of this the men are found to work more efficiently and less shiftlessly. The men come to feel themselves more a part of an efficient scheme and derive to some extent the pleasure experienced by the officer in finding work accomplished with less friction and lost motion. It may be said with some justice that the follow-up practice is sometimes overdone, but the experience of successful foremen will usually show that its judicious exercise is conducive to effective work, and those who have not adopted this practice will undoubtedly find it highly profitable to try it out.

LIKE A SUIT OF CLOTHES

A PROTECTIVE layer of treated timber that surrounds any stick which has been subjected to the preservative process is like a suit of clothes which a man buys to keep him warm in winter. If it is thin or contains little wool, it will afford him little protection against the rigors of winter. But even a good suit will soon become worn or torn if it is improperly cared for. So it is with treated timber.

One of the greatest difficulties attending success in wood preservation arises from a failure to understand this simple truth. The depth and quality of the treatment are the problems of the higher officers and the treating engineer, but the use or handling of the wood after it has been treated is something which concerns everyone who has any connection with the use of the wood on the railroads. Improper use of treated timbers may be considered under three heads: Rough handling, cutting and abuse in service.

Under the first classification must be considered the bruising or abraiding that follows the dragging, dropping or scraping of timbers while they are being moved into place and the use of sharp tools such as picks, shovels, cant hooks or bars. Another mishandling, referred to in A. F. Robinson's paper, found elsewhere in this issue, is the driving of piles with equipment causing shattering.

The second class of defective practices in the use of treated timber includes the dapping or adzing of ties for rail bearings, the framing of timbers to fit and the boring of holes for bolts or spikes. Arrangements for avoiding these operations on the treated timber by doing all the shaping or fitting of the pieces before they are treated introduces various complications, but these can usually be overcome. Some roads now have largely eliminated the adzing of ties by having rail bearings cut on them by machines before the ties are treated. The framing of all timber entering into complete Howe truss spans has been carried out completely in advance of creosoting.

The third item, that of mistreatment after being installed in service, is largely a matter of education. If men are properly schooled to avoid the rough handling of pieces while installing or treating them and to refrain from cutting them, little difficulty should be encountered on the score of abuse of the material, once it is installed.

GIVE THE MAINTENANCE WORK A CHANCE

ONE OF the conditions which is seriously retarding the use of labor-saving equipment in maintenance of way work is the common requirement that its operations much be conducted in such a way as to avoid interference with the movement of trains. This precludes the use of heavy equipment in large measure except under penalty of serious delays and also hampers the employment of the lighter devices. This condition is preventing the maintenance of way department from making cost reductions in keeping with those in other industries.

The business of the railway is to produce transportation as economically as possible. This includes not only the cost of moving the trains, but also the charges for the maintenance of the tracks and structures and all other items of expense which are incurred in the operation of a railway. There is, therefore, no economy in saving a dollar in operating costs by the elimination of delays to traffic if this requires the expenditure of two dollars by the maintenance of way department to prevent these delays. The problem is so to adjust and correlate the operations in all of the departments as to secure the lowest net cost.

On a single track line the problem is a difficult one. Obviously passenger trains must be permitted to pass without delay. It is, however, frequently possible to arrange the schedules of a large part of the freight trains so as to enable them to pass the work in fleets or outside of the hours in which the gangs are employed. On double track lines there is the added possibility of operating a short section as a single track.

One division engineer kept careful records of the cost of laying rail on a busy double-track line last season, not only when he had the full use of a track, but also when he had to take care of trains, and he found that the loss, when working two 60-men gangs, was $25 to $50 each time he closed up for a train. There is the further consideration that when a gang is given the use of a track and is permitted to work without interruption, it is able to complete its work earlier and remove the cause for interference with traffic more quickly.

These possibilities point to the importance of giving this subject careful study to determine to what extent request for the use of tracks can be justified. Obviously, maintenance of way officers can and should secure the tracks only when they can demonstrate that this action will promote economy. In most instances they have not made greater progress in this direction, because they have been content to proceed with the old methods, and have not investigated the subject as fully as the latent possibilities warrant. The initiative rests with them.

THE LAND OF OPPORTUNITY

American railway men in France during the war were astounded at the primitive, cumbersome operating methods in vogue on the French railroads. This fact stands out in sharp contrast with the position France occupies as a leader in science and learning. The answer is simple and can be applied to all Europe. There men are divided into two classes—those who use their hands and those who use their brains. Neither is allowed to do the work of the other. In America, the railroads have grown up with the men who run them and a man is expected to use his head as well as his hands. Here, improvements are being developed constantly by the practical men in the ranks or by those who have learned the business from the ground up. American railroads offer a chance to men who think.

Letters to the Editor

ARE MAINTENANCE MEN READERS?

Philadelphia, Pa.

TO THE EDITOR:

If you were to announce editorially that five out of six track foremen within a radius of 30 miles of one of the larger cities are subscribers to the *Railway Maintenance Engineer*, the statement would be regarded as propaganda and its accuracy doubted. Nevertheless, the writer is in a position to know that the figures are correct, and the supervisors of the Pennsylvania, the Philadelphia & Reading, and the Baltimore & Ohio in the vicinity of Philadelphia, whose co-operation made this result possible, can vouch for the correctness of the statement in so far as their own subdivisions are concerned.

The inquiry naturally presents itself: why should not this condition obtain? The men themselves have always known, and the higher officers are coming more and more to a realization of the fact that the maintenance of tracks is of a character demanding not only long training, but a degree of mental equipment which in some situations must be of a high order.

From a close observation of track and signal maintenance the writer believes that in this territory at least we have got back pretty nearly to "normalcy," both as to the character of maintenance and the efficiency with which it is being done. Invariably one now sees attentive and even industrious effort being put forth.

The mental state back of this accomplishment is reflected in the eagerness displayed by foremen for literature relating to their jobs. Not infrequently one hears the expression, "I ought to have the paper" or "I need that book," which shows that the man's interest is not of a perfunctory character, or simply the following of another's lead. The men seem to feel that in adding thus to their stock of knowledge they are helping to raise the standard of track work to a higher plane.

This desire for knowledge of new methods and practices, especially among the track foremen, who in this territory are about three-fourths of American and the remainder almost wholly of Italian nationality, is not, as might be supposed, confined to the former class, but is equally in evidence among the men of foreign birth. One cannot help but be impressed with the manner in which the Italian track foremen have forged ahead in the acquirement of a knowledge of the English language.

The use made of the railway periodicals and books is, of course, the crucial element of the whole matter. If the men merely subscribed to the railway papers, or purchased track books without reading them, there would be little added to the sum total of knowledge. Inquiries directed along this line have shown that the men do read them and that their reading is earnest and thorough. While some of the articles encountered may be beyond the full comprehension of every reader, much will still be gleaned which is helpful.

The reading of railway literature cannot help but enhance the man's own appreciation of his work. This thought was brought distinctly before the writer through a remark made to him by a learned professor, himself a writer of books on engineering subjects: "Let a man think highly of his job and he will be disinclined to enter into the industrial controversies of the moment." But it may be observed, on the other hand, that the interest shown by the men should, as it doubtless will, be given full consideration by the officers, to the end that the position should not only receive adequate compensation, but, in the case of the brighter and more studious of the men, be rewarded by advancement in the service. Promotion of track foremen to the position of supervisor has within the author's knowledge been productive of good results in several notable instances. W. F. RENCH.

GOOD TOOLS BEGET GOOD WORK

Newton, Kan.

TO THE EDITOR:

My attention has been called to discussions of the proper handling of tools and materials and of the unnecessary expense caused by the improper methods of using and caring for them by the track forces. To read some of the articles one would be led to believe that this is a hard problem to solve. I agree that the proper handling of tools and material is very important and a few lectures on the subject would help, but it is my belief that those who criticize should at least offer a remedy or a suggestion to better the condition to which they object.

There are two things concerning which I would caution the roadmaster. Do not be overzealous and don't be stingy. By their tools you shall know them. A good foreman will see that his men have good tools. The better the tools the better the work and the better the tools the better the care that will be taken of them. It is easy to judge the gang by the condition of the tools it is using.

On Section 7, for example, you will find six men tamping ties. An inspection will show three or four picks with loose handles, the points worn blunt and the tamping ends worn thin and sharp. Instead of driving the stones they split and crush them and cut the edges of the ties. Two men are spiking, each one taking turns at driving his maul on the handle. When lining the track a lack of lining bars will cause the men to use claw bars or to double up on the bars, a bad practice. When ready to fill in the track, the ballast forks will be missing so shovels will be used, although this should never be done in stone ballast. When it is necessary to make a move to some other point the water keg will be set on the front end of the car. This is a very dangerous thing to do and signifies absolute carelessness. Arriving at the tool house tools will be found scattered and all tools show evidence of being ill-used. More or less new and second-hand materials are mixed together and a general state of untidiness prevails.

In contrast to this is Section 6 with everything in good working condition, with proper tools to perform the work as it should be done. Everything is in place on the car and at the tool house, the surplus or emergency tools are in the racks and in as good shape as the day they were received. New and second-hand materials are taken care of separately. Here the roadmaster will find that he will get quick response to any improvement he suggests, as here he has equipment of the proper kind and in the proper shape for immediate use.

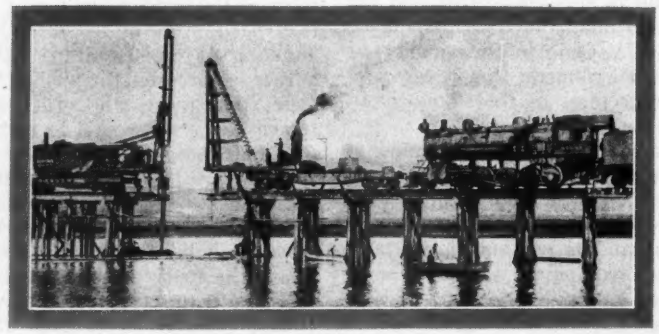
I do not say that the men should be encouraged to hoard tools and material, but if properly taken care of, they should be allowed what I would call an emergency surplus, as I have known emergency work, such as derailments, washouts, etc, to be made doubly expensive by not having the necessary tools and material to do the work as it should be done the first time. As an illustration, a pair of derailed wheels were pulled 3½ miles before they were discovered by the train crew, breaking bolts, cutting off and driving down spikes and damaging angle bars. To make the track safe it was necessary to rob almost as much undamaged track for bolts and spikes as had been damaged, thereby making the work more expensive. R. E. DONALDSON.

A Long Experience With Creosoted Timber on the Santa Fe*

The Service Secured From Ballast Deck Trestles Demonstrates Value of Wood Preservation

By A. F. ROBINSON
Bridge Engineer, Atchison, Topeka & Santa Fe System, Chicago

THE FIRST creosoted piles were used in 1875 in an open deck pile bridge built across Galveston bay. The first creosoted ballasted deck pile bridges were put into service on the Santa Fe late in 1899. The same season creosoted timber flooring was used on a ballast deck steel bridge at Los Angeles. When the joint track elevation bridges were built at Chicago, creosoted timber flooring was used to support the ballast. Following 1900 the use of creosote increased very rapidly, as by 1908 almost all timber used in bridges was creosoted.



From 10 to 12 lb. of creosote per cu. ft. of timber was first used for structures on land or fresh water. For structures in salt water a much heavier treatment was required. At present piles for marine service receive a light steaming and then from 20 to 25 lb. of creosote per cu. ft. of timber is forced in, or all the creosote the timber will take. For about ten years southern pine has been treated by the full cell process, some 14 to 16 lb. of creosote per cu. ft. of timber being used. At all of the Santa Fe treating plants southern pine for land structures is air seasoned and then creosoted without steaming or temperature. When we commenced using creosoted material the treating was done at commercial plants and the timber was steamed.

Our bridge list as of January 1, 1921, shows the following single track lengths of bridges. Arches, boxes and pipes are omitted, but T-rail bridges are included:

498,757 lin. ft. of open deck timber bridges.
222,520 lin. ft. of ballast deck timber bridges.
120,307 lin. ft. of open deck steel bridges.
147,995 lin. ft. of ballast deck steel bridges.
2,411 lin. ft. of reinforced concrete bridges.

991,990 lin. ft. all bridges—equals about 188 miles.

Almost all of the ballast deck steel bridges have cresoted timber floors.

The creosoted ballast deck timber bridges from 16 to 20 years old seem to be in perfect condition and give promise of being good for from 15 to 20 years more. These may, therefore, be considered as permanent structures. Some 38 per cent of all our bridges are ballast deck and almost 50 per cent will be termed permanent structures. For main lines alone, the percentage of ballast deck bridges is now 68 per cent. No open deck bridges of any kind have been built on the main lines during the last ten years, except after washouts or burnouts.

*Abstracted from a paper presented before a joint meeting of the Western Society of Engineers and the American Wood Preservers' Association at Chicago on January 25, 1922.

Early Difficulties

Creosoted timber bridges had not been in service very long before we found that there were many things to be learned about cutting, handling and curing before treatment; also, handling the treated material and building the bridges. During 1909 and 1910 we had a good many complaints about rotten piling on the Beaumont division, which extends from Somerville, Tex., to Longview, Oakdale, Beaumont and Port Bolivar. In this territory timber seems to be more readily affected by decay than in any other part of the country traversed by our lines.

A few miles east of Cleveland, Tex., we have what is known as an experimental section, where we try out all kinds of treatment on ties, fence posts, etc. This section was taken because the soil and climate seemed to be especially adapted to produce rot in timber, both treated and untreated. On this section I found at least 2,000 piles that were rotting very badly. The piling and timber used had been treated in commercial plants between 1900 and about 1907. Up to that time no rules had been made covering the time the material might be left in the woods after cutting or the time it was to be cured before treating. I think many piles had been left in the woods several months and the material had actually commenced to decay before it was taken to the treating plant.

Piles, after being driven in the bents, are sawed off for capping and our plans called for these freshly cut surfaces to receive a heavy treatment of hot creosote before the caps were applied. Notwithstanding this, we found a large per cent of the piles were beginning to fail at the caps. There would be an outer layer or ring of creosoted sap wood which was good, but inside this there would be a ring of untreated sap wood which was rotting very rapidly. In many cases a good deal of load was being carried by the outer creosoted ring of sap wood and but very little load by the heartwood. We found a good many cases of rot starting at or near the ground surface. Decay also commenced in holes bored for sway brace bolts and for other purposes. It would always start wherever the creosoted surface was disturbed or bruised deeply.

Our men had the unfortunate habit of chamfering the sides of the piles at the cap so they would drain. Frequently they would cut out large chips or sections from the side of a pile in order to make the sway braces draw straight, and in every case of this kind decay seemed to start very promptly, as the cut in the timber usually extended through the creosoted layer. Careful study

seemed to show that the cause of decay was due to leaving the heads of the piles or some other portions unprotected or untreated.

Another source of trouble was the driving of the piles. I found a good many cases where the heartwood had been broken loose from the sap. In the ordinary steam hammer the lower end, about 12 in. in diameter, projects through the driving block and strikes the pile. A circle 12 in. in diameter has a little more than one-half the area of a 16-in. circle and only about two-fifths the area of one 18 in. in diameter. From this you will note that the blow from the hammer was being delivered to the pile over an area of less than one-half its surface. The skin friction on the outer surface of the pile would hold it up and the hammer would drive the heartwood loose. We overcame this by providing a driving head 18 in. in diameter which rested squarely on the head of the pile, and was so arranged that the blow from the hammer must be distributed over the entire surface of the pile.

As a remedy for the above troubles we cut down the piles to good solid material and inserted framed bents or blocking of varying heights. When the piles were sawed the freshly cut surfaces were treated with three or four coats of hot creosote mixed with heavy road oil. A sheet of some kind of prepared roofing was then applied over the fresh coating, after which the creosoted timber bent was put into position and drift bolted to the piles. These repairs were made more than ten years ago and up to present writing we have not been able to detect any more indications of decay.

Irregular Penetration

When we cut out these piles the cross sections were examined very carefully and it was found that the creosote had penetrated the piles very irregularly. On one side the treatment would be almost as thin as a sheet of paper and on the other side it might be two inches thick, the thickness of treatment varying all around the surface of the piling. We figured that this was due to moisture in the piling, which resulted from the steaming and the improper seasoning. At our own treating plant at Somerville all material except that used in marine work is carefully air cured and receives no steaming of any kind. As the result of this handling, we have been able to get a very uniform penetration of the creosote. On the other parts of the Santa Fe system we have had very few piles failing at the caps. The trouble has been overcome in the same manner as noted for the Beaumont division.

Examination of the stringers in ballast deck bridges where steaming was done in treatment showed a condition similar to the piling, but it was not so extensive. In a very few cases we have found some of the outer stringers decayed on the upper surface, as a result of the irregular penetration of the creosote.

When we first commenced air seasoning material at Somerville untreated timber sleepers were used to support the piles of timber or piling. It was not very long before we discovered that these untreated timber sleepers were starting the growth of fungus or decay in the timber piles that rested on them, this decay frequently extending clear to the top of the pile of timber. We very soon found that we must use either creosoted timber sleepers, steel I-beams or concrete for supporting the piles of timber and piling, as this was the only means by which we could get the timber properly seasoned without causing decay.

Close attention is necessary in the air seasoning of timber piling. If the sap has commenced to turn or sour, the treating will not be effective. It is probable that different curing rules will be required in different sections of the country where the moisture conditions differ.

As the result of our trouble from the rotting of piles at the caps we made an extended test on a field treatment of piles when cut for caps. With our first apparatus we were able to get about ⅜ in. end penetration of the creosote. Several first-class creosoted piles were cut into lengths of about three feet and also a similar number of untreated piles which were reasonably well seasoned. A part of these short creosoted specimens received the end treatment with our pressure apparatus. The other samples were painted with various kinds of preserving material and also several kinds of "R I W" paint. After the coatings had properly dried these short pieces of piling were set up in a trench in the ground on the right-of-way two miles east of Cleveland, Tex. These pile butts were set in an exact line and at the same elevation. A cap 12 in. wide and 4 in. thick was placed on top of the row of pile butts so that the test would be relatively the same as in the bent of a pile bridge.

We have examined these pile heads annually for eight years. At present the samples of creosoted piles having pressure treatment on the ends and several of those receiving brush coatings on the ends are still in good condition. These investigations lead me to feel that a brush coating of hot, heavy creosote, of Reeves Wood Preserver and Toch's "R I W" paint will protect the freshly cut heads of creosoted pile for a long time. I am not as yet certain whether it will be necessary to use the pressure treatment for the ends of piles, since the brush coating seems to be giving extremely good results thus far and the application of this brush coating will cost considerably less than the pressure treatment.

Investigations made seem to show that the following rules must be adhered to absolutely in handling treated timbers:

1. Treated timber must not be cut, bruised or handled in a rough manner. Grab hooks or dogs should not be used in handling the material, unless the holes made by the hooks are carefully plugged with creosoted pins.
2. The driving of piles must be done with a hammer which will not split them or break the sap loose from the heartwood.
3. Any cut surfaces or bored holes must be carefully treated with hot creosote and the holes plugged.
4. Where solid stringers are used in ballast deck bridges without any cross planking it is necessary to make end cuts on some of the sticks on account of the variation in panel lengths of bridges due to driving of piles. These freshly cut ends must be thoroughly coated with creosote before the stringer deck is placed.

In 1910 we made a new set of standard plans for ballasted deck pile bridges. In these plans the stringers were spaced seven inches apart in the clear and lapped by one another on each second cap, cross planking being used to hold the ballast.

The stringers called for in these new plans were 7 in. by 16 in. — 30 ft. and they had a working depth of 15¾ in. We soon found a sufficient supply of these 30-ft. stringers could not be obtained within reach of our lines in Texas and Louisiana, and as a result the plans were adopted for territories where we used only Oregon fir stringers. In open deck timber bridges the stringers and ties are untreated, but for some years past the ties on open deck steel bridges have been creosoted. The ties are always run through a surfacing machine and brought to exact depth.

While Oregon fir loses a considerable percentage of its strength as a result of steaming or boiling during treatment, we have had no stringers break under traffic. Fir caps in bridges built under our old standard plans have, however, given some trouble. A good many fir caps are "boxed heart" pieces and our old ballast deck bridges had too many drift bolts through the stringers into the caps. The failures in caps were always in Oregon fir

pieces. In almost every case of failed caps I found the timber was actually burned or charred in the boiling treatment and the sticks broken up into rings, much like the layers in an onion. Culling "boxed heart" pieces and holding the boiling temperature to a maximum of 220 deg. F. very largely stopped the trouble with the fir caps.

Treating Plants

The Santa Fe has built four treating plants. In 1885 a plant was opened at Las Vegas, N. M., but it burned down in 1908. In 1898 a plant was opened at Bellemont, Ariz., and this burned down in July, 1906. Both of these plants were designed for the zinc chloride treatment, although some creosoting was done. The buildings for these two plants were temporary wooden structures in which the fire hazard was high.

The present plant at Somerville, Tex., was opened in 1907 and the Albuquerque plant in 1908 or 1909. The buildings for these two plants are of reinforced concrete, thus reducing the fire hazard to a low figure. Both of these plants were designed exclusively for creosoting. During the late war period and nearly two years thereafter ties were treated by zinc chloride process, but all bridge timbers and piles were creosoted. The total output from the four treating plants above noted is as follows:

	Ties	Timber Board feet	Piling Lin. feet
Las Vegas	6,221,598	22,575,490	790,729
Bellemont	2,123,519	9,607,215	224,521
Albuquerque	7,346,245	20,067,932	512,580
Somerville	43,423,230	213,411,285	8,172,169
Total	59,114,592	265,661,922	9,699,999

Some 380,300 lin. ft. of the above piling was treated by the Rueping process at the Somerville plant in 1906 and 1907.

On the Coast Lines redwood and fir ties have been used extensively. Since the Albuquerque plant has been in operation we have sent its output on to the Albuquerque and Arizona divisions, as well as lines east and south of Albuquerque.

Track Ties

Ties from Las Vegas and Bellemont plants were generally treated by the zinc chloride process, while creosote is used at Somerville and Albuquerque. The Rueping process has been used as standard, some 5 lb. of creosote per cu. ft. of timber being left in the tie. On our eastern lines we have also used a great many oak ties creosoted by the Ayer & Lord Tie Company, Carbondale, Ill. We are getting an average life of more than 16 years out of all our treated ties and about 60 per cent of them are loblolly pine (the above applies to lines east of Albuquerque). This long life may partly be due to instructions issued in 1910 that all new ties going into track must be plated.

Originally tie plates were from 4½ to 5 in. wide by about 6 in. long. Our first flat bottom plates were 6 in. wide by 8 in. long and the present standard plate is 7½ in. wide by 9 in. long. Our present plates cut into the tie at the outer end, showing that the loading is not properly placed. A new design will probably be made, increasing the length of plate on the outside of the rail. The exact percentage of increase will depend on the weight of heavy rail that may be adopted.

A good many ties have been taken out of service, because of mechanical wear, when there were no indications of approaching decay.

Six or seven years ago adzing or dapping machines were installed at our treating plants. Just before going into treating cylinders all ties are dapped for the tie plates and bored for spikes. At this time the ties are sawed to exact lengths, a short section being taken from each end. As a result a good many ties are culled after sawing, because this discloses decay which did not show before the end of the tie was cut off.

Considerable timber has been used for the floors in ballast deck bridges. When we figure interest on the excess cost of the ballast deck over the open deck structure and also the cost of maintenance we can show a very interesting saving from the use of the bridges having the ballast decks.

An interesting feature of the ballast deck bridge is the very low maintenance cost. When the track has been thoroughly bedded and properly lined and surfaced almost no further expenditure is required during the life of the track tie. We have bridges about 100 ft. in length which we have run from three to seven years without receiving attention other than the lifting of a few joints at very rare intervals.

Discussion

In discussing this paper, C. M. Taylor (superintendent timber preservation, C. R. R. of N. J. and P. & R.) pointed out the fact that part of the early difficulty with treated piles for land use was due to the lack of realization of the necessity of giving them nearly as heavy a treatment as for marine work He also emphasized the importance of engineering officers anticipating their needs for piling and other treated timber far enough in advance to enable this material to be air seasoned and treated properly. No one engaged in the treatment of timber desires to season timber by steaming and this is done only to meet demands for early deliveries. J. H. Watermann (superintendent timber preservation, C. B. & Q.) deprecated the emphasis which is placed on the loss of strength which occurs in treating bridge stringers because of the fact that the loss due to decay in untreated timbers soon exceeds this amount.

I. L. Simmons (bridge engineer, C. R. I. & P.) stated that the Rock Island has approximately 341,000 lin. ft. of bridges, about half of which are provided with open decks. Prior to the use of ballasted deck construction the fire loss on bridges averaged approximately $7,000 per year. Since the use of this form of construction has become more general, this loss has increased to approximately $11,000, the fires now, however, occurring more commonly during construction when the loss of material not yet incorporated in the structure contributes approximately half of the loss. He doubts if there is any greater fire hazard with a creosoted structure properly treated than with an untreated structure. He does not, however, advocate the installation of a creosoted structure in or near a town because of the danger of fires started by tramps.

George E. Rex (vice-president National Lumber & Creosoting Company) stated that as a result of his extended experience in the treatment of timber on the Atchison, Topeka & Santa Fe, he believed that 40 years is a low estimate of the life which that road will secure from its ballast deck trestles. He placed special emphasis on the necessity of using only sound timber and then of treating it properly, pointing out the fact that exterior appearance is no criterion of the interior condition of a stick of timber.

G. A. Haggander (bridge engineer, Chicago, Burlington & Quincy) stated that the Burlington built its first creosoted ballast deck structure in 1904 and that this structure is still standing without a single timber having been renewed. As a result of this experience this road is now building many ballasted deck trestles. Although the road has not yet treated its bridge stringers it is now giving this phaze of bridge maintenance consideration.

The Employer Is Always Looking for Men He Can Promote

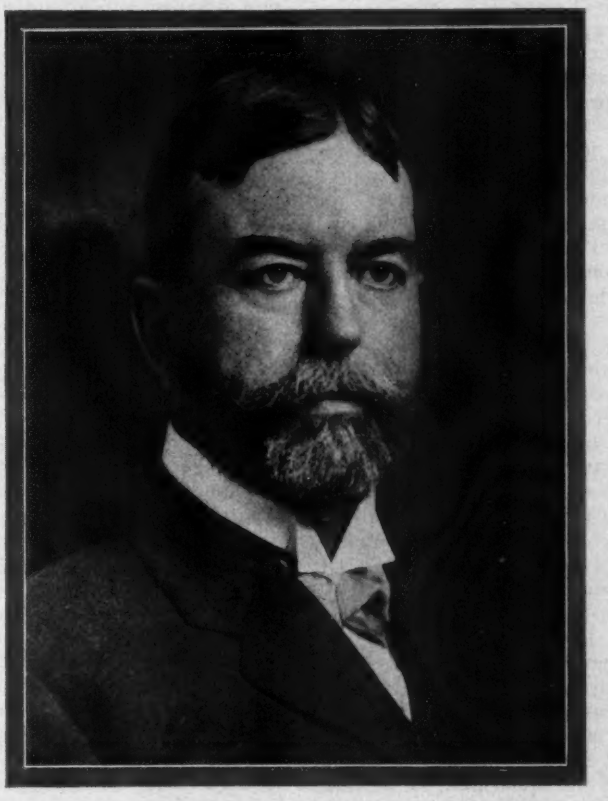
This Demand Is Just as Urgent, Says President Loree, as Is the Employee's Desire to Obtain a Good Job

By WALTER S. LACHER

"EXCEPT for the army and navy in time of war, I believe that the railroads offer the highest type of activity anyone can find." This is the opinion expressed by Leonor Fresnel Loree, president of the Delaware & Hudson and chairman of the board of the Kansas City Southern, who entered railway service as an engineering assistant at 19, became a division superintendent at 31, a general manager at 38 and president of a large road at 43. As a young man, trained as an engineer and who gained the first 12 years of experience in engineering and maintenance of way work, his rapid rise to an executive position is a source of intensive interest and inspiration to the young man in maintenance of way work.

Of particular encouragement is the simple formula which Mr. Loree sets up as essential for success. To be sure, it is prompted by a modesty that deprecates personal achievement. Nevertheless, it contains wholesome advice. In answer to a question as to the requisites he demands of a subordinate he specified "a sound mind and a sound body."

"A man must have a strong, healthy body," he explained, "in order that he will not break down under stress of hard work. He must also have a healthy, normal mind; one that has no kinks in it. By that I mean he must be ruled by the laws of the relations of things. He must be one who is willing to accept things as they are, but with sufficient common sense to distinguish between those things that are fixed and those that are subject to his will."



L. F. Loree
President, Delaware & Hudson

As a graduate of Rutgers College in 1877, Mr. Loree experienced the discouragements that befall every young engineer in railroad service. He obtained a position with the Pennsylvania on terminal construction in New York harbor and when this work was completed he found himself through reduction in force out of a job. Later he obtained employment as a transitman on some government work and after an interval was again compelled to look elsewhere, with the result that he became a leveler, transitman and finally topographer on the preliminary survey and location of the Mexican National from the Rio Grande to Saltillo, Mex. After two years this work ran into financial difficulties and was suspended, forcing young Loree back to the United States to look for another job. He was offered a place on the Northern Pacific, as an instrumentman on location in the Siskiyou mountains, but in the meantime obtained a position as assistant engineer on the New York division of the Pennsylvania Railroad through J. T. Richards, with whom he had formerly worked. When James McCrea, later president of the Pennsylvania, who had been the superintendent of the division, went to Columbus, Ohio, as general manager, he sent Mr. Loree to southern Indiana to make location surveys for coal lines.

Mr. Loree placed particular emphasis on this point. "During my first two years' work on the Pennsylvania I made every effort to win the confidence of my superiors and also to become acquainted with everyone connected with the department in which I was employed. The regard with which a man is held by his superiors plays a very important part in the success he may attain, since the superior is master of his destiny while he remains in his employ and is also a most important factor in his chance for securing employment in other connections."

"But what course of action should a young man take in case he finds that his immediate superior is a man of limited ability?" he was asked.

"If your immediate superior is not what he should be, it seems to me you must look higher and see if there is not something wrong with the man above him or with the company. If you can satisfy yourself that the company you are working for is a good one and that it is being well managed, you need not worry very much about your immediate superior. He will be found out soon enough and the matter will be worked out without much concern on your part."

"But should not the young man endeavor to obtain a position with a railroad having an organization in which the line of promotion clearly defined," he was asked.

The answer to this expresses the viewpoint of the executive and well it may, for Mr. Loree has been either a president or chairman of a board or both for the last 20 years. For three years he was president of the Baltimore & Ohio, following which he was president of the Rock Island for a short time and for the last 14 years he has been the president of the Delaware & Hudson. In addition, as chairman of the executive committee and chairman of the board of directors of the Kansas City Southern for the last 17 years, as well as a director of a great many railway and other corporations, he is constantly confronted with the problems of the employer. "Yes," he said, "it is an advantage to be employed with a company that has the line of promotion clearly defined. However, you must realize that the employer is just as anxious to obtain able men for his own organization as the employee is desirous of obtaining a good job. Therefore, no matter what the circumstances are, if the employee does his best and shows himself worthy, the opportunity for advancement will come."

"You obtained a varied experience through exigencies of fate that do not befall everyone. Should opportunity for this be unfavorable, does a young man not owe it to himself to broaden his experience on his own account?"

"Yes, by all means. That is, in fact, a natural trait of human nature. This was long an established custom among the journeymen of Europe. After serving apprenticeships in the various trades they would travel from place to place, broadening their knowledge of the craft and of the ways of men. This nomadic tendency continued until the individual found a place that met his own requirements and tastes. This custom is beneficial if not carried too far."

But getting the right job is only a start. To hold it and merit advancement is the real test. While Mr. Loree takes the attitude that an account of his early experience can be of little value to others, his record bears the mark of a well-developed and often-applied initiative. He had a faculty for going to the bottom of the problem imposed on him and once he reached a conclusion, he did his utmost to have his ideas put into effect. During his employment on the Panhandle in 1883, it is said that he attracted the attention of his superiors through his criticism of the plans of a certain yard he was instructed to lay out, as a consequence of which a new plan was prepared embodying his ideas. In the following year he was promoted to engineer maintenance of way, a position which he held on various divisions until 1889, when he was promoted to superintendent. While all his subsequent positions have been operating or executive, it is apparent from his writings, his analytical method of attacking new problems, and his application of scientific principles in the management of the properties under his direction, that he has a clearer grasp of engineering principles than is usually the case of the man who has occupied administrative rather than technical positions.

In answer to a question as to whether he favored executive rather than technical training for the engineer as offering the greater opportunity, he replied in a vein that is characteristic of a man who has worked hard for the pure enjoyment which he derived from it:

"That depends upon the man. If he has a taste for engineering, or a taste for medicine, law or some other profession, I believe he will be happiest if he follows his own predilection and that he will be amply rewarded for following his particular leaning. However, if he has no decided taste I believe it will be to his advantage to foldow the broad lines of general business or any position primarily demanding executive ability."

A study of President Loree's career goes to show that he is much more than an engineer. His rapid rise to the position of general manager of the Pennsylvania Lines West has been ascribed partially to the outstanding work of the forces under him at Johnstown after the disastrous flood of 1889 and to the courageous part he had in the defeat of the A. R. U. strike in 1894. There is earnest, sober advice in the words he impressed on his subordinates when general manager of the Pennsylvania Lines West. "Employ a better class of men, discharge the vicious and incompetent, educate those you keep." However, he has not been content with a solution of engineering problems and the management of men. He has been an omnivorous reader and a prolific writer who has evinced a broad knowledge in matters far outside the scope of his chosen field. No doubt it was this wider interest that won him the appointment as judge of transportation for the World's Columbian Exposition (the first railroad man to be selected for this position, though he was at the time only 35 years old). In 1900 he was selected as chairman of the United States Delegation to the International Railway Congress at Paris and is now one of seven American members of the Permanent Commission of the International Railway Congress. As he puts it: "A young man should take an active interest in the affairs of the community in which he lives. The time thus spent carries its own reward."

Pick the Season for the Work*

By J. M. Garner,
Supervisor, Carbondale, Ill.

After a little more than 34 years' experience in maintenance of way work on the Illinois Central System, handling almost all kinds of ballasted track, including dirt track under all conditions, my observation has been that work done from April 1 to July 31 holds better than work done in any other month in the year. Track work done in August and September usually does not stand well, due to heat, which seems to take the life and qualities out of ballast of all kinds, even dirt.

In other words, work done when ground is seasonable for the farmers to farm and cultivate their crops is always best for putting up track which stands better. This may seem out of place, but it is a fact. To plow wet ground injures the land and growing crops. To do track work during wet weather does the track no good. To plow land in August and September is injurious to the farm land, as it is dry and lifeless, and so is railroad ballast.

Track should be disturbed as little as possible during December, January, February and March, as the more the track is disturbed during these four months the worse it gets. If we cannot put up our track so it will hold up when weather is seasonable, we are going to be in a bad way when we have to spend money trying to keep up track during wet and unseasonable weather.

Some may differ with me in regard to the force that should be worked on track maintenance, but from my experience I will say that a good force should be put on the first of April and get as much track work done just as early and quickly as possible, before vegetation gets so rank. Track work done early usually holds better.

And again when vegetation gets rank in most localities, it will require about every ninth man to clean away vegetation for the eight other men to do their work properly. This ninth man is an entire loss over work done early, before vegetation gets in the way of doing work properly.

Through the four months of December 1 to March 31, inclusive, only small forces should be worked, just enough to maintain a good safe condition. It is not the amount that is done that counts, but the way it is done, and this means that nothing should be left undone.

*From the Illinois Central Magazine for October, 1921.

Renewing Bridge Ties.

Getting the Maximum Performance Out of Locomotive Cranes

The Lehigh Valley Utilizes Equipment of This Kind in Large Numbers to Excellent Advantage

FROM TIME to time doubt has been expressed by maintenance officers as to the advisability of securing enough mechanical equipment to carry out efficiently certain phases of maintenance work which are more or less seasonal. Many have considered the locomotive crane a valuable addition to maintenance equipment but have believed that if many cranes were purchased, there would be much of the time when they would be idle, to the detriment both of the machines and the purse of the railroad. In contrast to this opinion is the actual practice of the Lehigh Valley—a road that uses 47 locomotive cranes on a line 1449 miles long, probably more cranes per hundred miles of road than any other railway in the country. The experience of this road in respect to this class of equipment is so instructive that this article was written in an endeavor to describe the many purposes for which the road has found it profitable to use cranes in maintenance of way work.

A Question of More Cranes—Not Idle Time

In spite of the large number of cranes employed by the Lehigh Valley, the experience of this road has been that there are so many tasks for which a crane is fitted that the question becomes one not of possible idle time but of enough cranes. There is nearly always a waiting list of work. As a general rule the cranes are assigned regularly to the different divisions, the division engineer being held responsible for his assignment. He sees that they are employed to the best advantage by making an equitable distribution of the equipment on his division to whatever department may have need of them.

In that way, locomotive cranes used by the engineering, maintenance of way, mechanical, operating and other departments, for all departments find plenty of uses for them, become a special charge of the division engineer. In turn, he makes a weekly report to the engineer maintenance of way, who is responsible for all of the cranes on the system. The returns show the number of cranes on each division, their assignment, where they are located and what they have been utilized for. The engineer maintenance of way's office force compiles this information into a weekly system report such as is included in this article. Where additional cranes are needed on any division or divisions, it is possible for the engineer maintenance of way to make the assignment most economically through the aid of this information which is thus before him every week.

At the present time the road is using a variety of makes and capacities of cranes but it is working toward the end of confining itself to possibly one make and one size. During the past few years it has been found that the larger sizes are more economical in the long run, all things considered. The latest cranes have a capacity of 30 tons.

In compiling the list of uses for locomotive cranes, every attempt has been made to have each item represent a general use or purpose and so far as possible to eliminate the numerous classes of work which, while differing slightly, fall under a broader heading. One thing distinctly noticeable in securing this information, was that there was apparently no narrow limit to possible locomotive crane applications in actual railway work. Statements by many Lehigh Valley men indicate that the more they use them, the more uses they find for them. Practically no contemplated work is undertaken without first planning how much of it can be handled effectively and economically with cranes.

Numerous Items Are Instructive and Interesting

A majority of the uses listed in this article are self-explanatory. There are others, however, regarding which it is both interesting and instructive to expand upon. Rail laying, one of the more prominent maintenance of way utilizations of cranes, has already been described in detail, an article on this feature having appeared on page 466 of the December, 1920, issue. In ballast cleaning, a more recent development, the crane has been found to be a valuable time and labor saver. Good results have been obtained by forking the ballast out from between the ties and down to the bottom of

REPORT OF LOCOMOTIVE CRANES FOR THE WEEK ENDING NOV. 19, 1921

Division	Crane Number	Wheels	Received	Capacity Tons	Assigned to Dept.	Location	Condition	Shop			Remarks
								Location	In	Out	
	95532	8	5-1912	15	M. E.	Jersey City					Ash pit.
	33	8	4-1906	14	C. T.	Nat. Docks		Easton			For repairs.
	37	8 Mag.	5-1912	15	C. T.	Nat. Docks		Easton			For repairs.
	54	8	12-1912	20	M. W.	Greenville					Handling track material.
	67	8	1917	25	M. W.	Newark					Tearing down coal pockets.
	31	8 Mag.	7-1912	15	C. T.	Oak Island and Nat. Docks					Handling freight.
	34	8	7-1907	14	M. E.	Perth Amboy					Ash pit.
	50	4	8-1909	10	M. E	Oak Island		Easton			For repairs.
N. J. & L.	95536	8	8-1907	14	M. E.	Easton					Work train.
	38	8 Mag.	12-1911	15	M. E.	Packerton					Lumber yard.
	43	8	9-1910	17	M. W.	Easton					Handling track material.
	44	4	3-1909	12	M. E.	Lehighton					Ash track.
	45	4	3-1909	12	M. E.	Lehighton					Coal wharf.
	55	8	12-1915	20	M. W.	Lehighton					M. of W. work.
	68	8	11-1917	25	M. W.	York Farm Jct.					M. of W. work.
	42	4	4-1906	10		Glendon					Ash pit.
M. & H.	47	4	6-1909	15	M. E.	Weatherly					Frog shop.
	60	8	1-1916	20	M. W.	Ashmore					Being overhauled.
	65	8	1917	25	M. W.	Delano					Loading and unloading scrap, rail, ashes, etc.
	62	8	9-1916	20	M. E.	Delano					Ash pit.
Wyoming	95529	8	1-1913	20	M. W.	White Haven					Cleaning tracks, tunnel and stone ballast.
	39	8	1-1912	20	M. E.	Bridgeport					Coaling engines.
	48	4	7-1909	15	M. E.	Coxton					Stocking coal.
	59	8	1-1916	20	M. W.	Coxton					Unloading ties, cleaning out under bridges, cleaning track, etc.
	61	8	9-1916	15	M. W.	White Haven					Laying new rail, transfer relaying rail, cleaning tracks, unloading sand and track material.
	95528	4 2nd hand	1916		M. E.	Sayre shop					Handling M. E. material.
	40	8	12-1910	17	M. W.			W. B.	8-17	11-22	For repairs.
	41	8 Mag.	11-1910	15	M. E.	Sayre shop					Handling M. E. material.
	58	8	12-1915	20	M. W.	Laceyville					Placing rip rap.
	66	8	1917	25	M. W.	Tunkhannock					Handling ashes.
	53	8	9-1910	15	C. T.	E. Waverly					Screening stone ballast.
	35	8	3-1907	20	C. T.	Sayre					Cleaning up stock coal.
Auburn	95530	8	11-1912	15	M. W.	Cortland					Loading ashes, coaling engines.
	46	4	4-1909	15	M. E.	Cortland		W. B.	11-18	1-20-22	
	49	4	7-1909	15	M. E.	Auburn					Loading ashes, coaling engines.
	57	8	12-1915	20	M. W.	Barney					Ditching.
	51	4	8-1909	15	M. E.	E. Buffalo					
	52	4	5-1910	10	M. E.	E. Buffalo					Handling car shop material.
	56	8	12-1915	20	M. W.	Manchester					Handling track material.
	63	8	12-1916	25	M. W.	Susp. Br					Coaling engines.
	64	8	1917	25	M. W.	Tifft Farm					Stocking coal.

them, the foul ballast being piled in the center of the track. A locomotive crane equipped with a clamshell bucket picks up this ballast to a depth below the bottom of the ties, discharging it into a large screen mounted on a gondola. The cleaned ballast runs down the screen and is returned to the track, the dirt falling through and being retained in the car.

The Lehigh Valley has used about 14 screens for this purpose during the last season. Generally from three to four cranes are sent out in a work train to one job, where they are spotted. As soon as it is necessary to clear the track the work train picks them up again. Some very satisfactory results have been attained by this method while working under traffic.

The tendency on the Lehigh Valley in connection with the tie tamper compressors, has been to retain these units in one position as long as possible by the use of long pipe lines and thus reduce the number of moves to a minimum. Such moves as are necessary are made by a work train with a locomotive crane, the crane picking up the compressor and equipment and loading it on the train. It is then transported to the next location and placed in position. This transfer is not made the cause of a special work train trip but it is done at a time when a work train is passing by working in the vicinity.

A Valuable Adjunct in Renewing or Moving Steel

The renewal of frogs and switches of all types is effected by cranes alone and in combination with a work train, according to circumstances. An example of the time which is saved is shown by the fact that three 136-pound frogs at different locations were renewed in one-

half hour, using a work train with a crew of six and a section gang of eight men. There are also many instances in yards and other tracks where it is necessary in the re-arrangement of tracks, switches and frogs to move such tracks and ladders a certain distance. This can be done very conveniently with a locomotive crane. In many cases, one and sometimes two and three turnouts coupled together are dragged bodily to the new location. This is accomplished by disconnecting the sidings from the turnouts, leaving the latter intact and placing one-inch boards under the switch ties to prevent the ballast or sub-grade from piling up when the turnouts are being moved.

The list of applications shows several items concerned with the handling of materials. One of the interesting

Swinging New 136-lb. Rail in Place

methods in use is the way in which a locomotive crane can load such material as splice bars, tie-plates, bolts and spikes effectively and quickly. In common with many roads the Lehigh Valley assembles its materials in designated store yards from which it is distributed along the line when it is needed. In piling splices, tie-plates, etc., in the yard, care is taken that each pile is kept within certain limits of size. Thus when it is necessary to load splices for instance, a crane is run in, a clam shell bucket dropped over the pile and the splices picked up quite cleanly. Kegs of spikes are handled the same way, the bucket picking them easily and without damage. The time saved in loading a car is large.

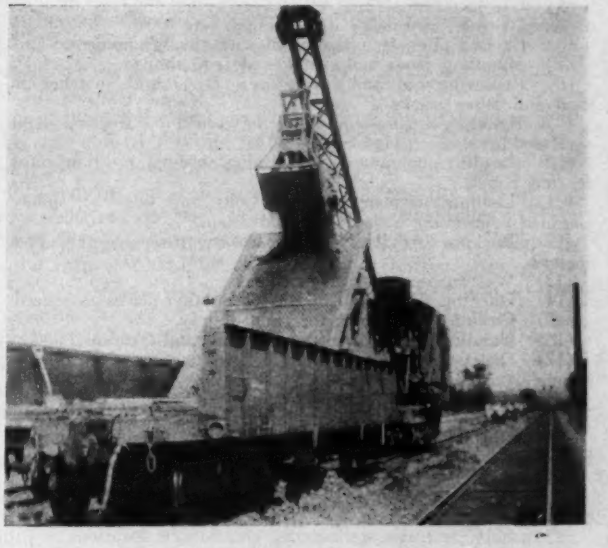
Constructing New Lines With Cranes

The construction of branch lines, sidings and industrial tracks is performed with a locomotive crane which distributes the ties and lays the rail. In building a line by this method only one-half of the ties are inserted on the first time over, the remainder being delivered, unloaded and put in track later. The ties are piled in bundles in the car behind the crane. The rails are likewise carried behind the crane, which first picks up a bundle of ties and drops them on the subgrade where they are spaced. The rail is next picked up and swung into place where it is spiked down. This method has been found to be both fast and satisfactory and while there are no definite figures as to the rate which it is possible to attain, some observations on the Seneca Falls, N. Y., to Cayuga line indicated that track was laid at the rate of about 34 rails lengths per hour. Cranes are also used for raising track particularly in yard, siding and industrial work. Ashes or other materials are dumped on the track in the usual manner, after which it is raised evenly by the crane, the cable being fastened either to a chain sling or to some form of clamps on the rail. Raises of from 1 to 15 ft. are made this way by simply repeating the operation of dumping materials and lifting the track up through it.

Cranes Take Place of Work Trains

On account of the self-propelling feature, it is possible to use a crane in place of a work train engine around yards and even on main track movements. A crane will ordinarily handle two or three cars without difficulty, even on grades. At Sayre, Pa., which is but one instance among many, it is used extensively around the yards where it was formerly considered necessary to use an engine and crew. One way in which it is utilized for two purposes is in cleaning up all debris, etc., in yards and terminals. All trash is swept or raked into piles near the tracks, the locomotive crane and one or more cars then picking up the piles and loading them into the cars. Refuse not picked up clean by the bucket is swept up and shoveled into it. Work train service is eliminated entirely with the added advantage of the flexibility of the crane and the fact that it can be obtained more readily.

In renewing bridge ties, the crane has been used to advantage. In addition to speeding up the work with a consequent saving in cost, it has also reduced the expenditures ordinarily necessary, by eliminating work train service. On the main line bridge over the Susquehanna river at Towanda, Pa., the old ties for one track were removed and the new ties placed and the rail laid, etc., in 12 hours working time without work train service—a dis-



Dumping Ballast on the Screen

tinct saving when it is considered that it would have taken from one to two weeks with other methods. This application was described in the maintenance of way section of the Railway Age Gazette, of September 17, 1915, page 526. In this work two cranes are used, one on each end of the bridge. These cranes work toward the center, lifting out the old rail and setting it aside. The old bridge ties are then removed, picked up in bundles and loaded on a car behind the crane. New ties, framed previously, are also carried behind the crane and as space is opened up by the removal of the old, a bundle of new ties is swung into position. These are installed, after which the crane picks up the rail and lays that. The cranes then move forward and repeat the operation. When the center is reached all of the bridge ties have been renewed completely, all work is complete and the track is ready.

Cranes Are Used Extensively for Excavating

When slides occur, the call is usually for locomotive cranes since it is the experience of this road that they are faster in cleaning up slides. The long reach is a material advantage, since the material can often be wasted to one side where otherwise it would be necessary either to re-handle or load it into cars. The use of a crane has been advantageous in gravel and sand pits where a steady output of material is not required. A steam shovel must be kept in the pit, while the crane can be pulled out readily and dispatched to other locations for other work.

A recent highway bridge construction job is illustrative of another method for crane work. The elevation of the structure required considerable filling of the approaches. The boom of the crane was long enough to handle ashes from cars on the tracks and place them the required distance behind the abutments. Without the cranes it would have been necessary to dump the filling alongside the track and wheel or otherwise convey it to the approaches.

The two instances given are indicative only of the use to which this equipment may be applied. A perusal of the list will show many more general items covering a wide variety of excavating uses.

Along the waterfront, it has been convenient and economical to use cranes for dredging around pontoons and float bridges. This avoids the expense of securing a contractor's equipment to do small jobs and it is also possible to perform the work somewhat better since it is difficult for large equipment to reach the in-shore ends of pontoons. The suction wells are dredged with cranes in contrast to the hand labor method which would otherwise have to be employed because of the size of the wells. The suction wells are enclosed with piles which, however, do not keep out the mud and several times a year it is necessary to lift the pipes and clean them out. This operation now takes about two or three hours as compared with three or four days for a gang of men previously.

The hooking-up gears and frames around transfer

USES OF LOCOMOTIVE CRANES ON THE LEHIGH VALLEY ROADWAY

Roadway

(1) Laying rail (Method as described in *Railway Maintenance Engineer).*
(2) Cleaning ballast by means of large screens mounted on cars and ¾ yd. buckets.
(3) Loading, unloading and placing tie tamper air compressor outfits.
(4) Loading ties for local or other delivery by means of slings.
(5) Use in terminals and yards for the handling of all sorts of scrap, refuse, sweepings and cleanings, etc.
(6) Driving piles, being equipped with steam hammers.
(7) Handling frogs and switches at frog shops.
(8) Removing old and laying new frogs and switches in yard and other tracks.
(9) Handling treated timber at the company's treating plant at Manville, N. J.
(10) Loading, unloading and placing in final position snow fencing panels.
(11) Loading tie-plates, splices, bolts and kegs of spikes. Used in connection with a bucket.
(12) Rocking turntables when necessary to replace or change centers.
(13) Wasting dirt in case of slides.
(14) Ditching along right-of-way or in other places as desired.
(15) Cleaning or policing the right-of-way.
(16) Handling steel for bridge renewals and erection.
(17) Distributing stone ballast where uneconomical to distribute by opening hoppers.
(18) Cleaning snow out of cuts.
(19) Setting up highway crossing alarms.
(20) Cleaning off tunnel portals—men shoveling into a bucket.
(21) Dredging around pontoons and float bridges.
(22) Raising tracks, sidings, etc., either for permanent raise or in stocking coals, etc.
(23) Shifting track or turnouts, etc., to new locations.
(24) For use in construction where bents and materials are framed in advance, moved in and placed in position by cranes.
(25) Laying new track on branch lines and sidings. Ties handled in bundles, rails laid and crane moved ahead.
(26) Placing pre-cast concrete slabs in bridge and other work.
(27) Setting up steel stacks of all dimensions and sizes up to the capacity of the machine in tons, etc.
(28) Loading, distributing and installing reinforced concrete and other types of culverts.
(29) Erection of building and sheds, handling material, placing timbers or steel trusses, etc.
(30) Picking up and loading gravel and sand at company pits.
(31) Distributing material and charging mixers in concrete work.
(32) Excavating for bridge piers and abutments.
(33) Digging for and placing cribbing and filling same.
(34) Grading for industrial tracks and other sidings.
(35) Grading approaches on overhead highway crossing bridges.
(36) Hooking up gears and frames at transfer bridges.
(37) Loading, unloading and placing steam boilers, etc., at drawbridges and power houses.
(38) Picking up, distributing and placing rip rap in the construction of retaining walls.

Bridge and Building.

(39) Picking up, loading or shifting small buildings.
(40) Tearing down and distributing timbers in obsolete coal trestles, as for instance in the work at Tifts farm described in the *Railway Maintenance Engineer* for January, 1921, page 4 and at Jersey City.
(41) Raising small bridges where it is necessary to secure greater clearance. Used in place of jacks.
(42) Handling bridge timbers such as decking, ties, etc. Used to remove old and place new in position.
(43) Erection of highway crossing bridge in connection with an extension of the boom.
(44) Lining tunnel. Steel sections carried in on top of boom and placed in position.

Water Service.

(45) Setting up stand pipes, water tanks, and pipe lines, etc., in water service work.
(46) Unloading and placing various classes of pumps. If unable to move into building and place into position the material is moved as near to its final position as possible.
(47) Cleaning out suction wells for fire protection pumps.
(48) Excavating trenches in water service and sewer work.

Signal and Electrical.

(49) Loading and placing concrete telephone booths and battery wells, etc.
(50) Pulling up and loading or unloading telephone, telegraph poles, etc.
(51) Setting up telephone and telegraph poles, also signal poles and bridge warning signs.
(52) Erecting or moving signal bridges. New foundations made ready and bridges picked up as a unit where possible or in sections otherwise and moved to new location.

Other Uses.

(1) Rerailing cars in yard or other work.
(2) Handling freight at waterfront terminals.
(3) Handling sand at terminals, filling bins, etc.
(4) Wrecking purposes, picking up and throwing aside or loading all refuse, freight, coal, burnt timbers, car parts, etc., up to the capacity of the machines.
(5) Handling ashes at engine terminals in connection with various types of pits.
(6) Stocking coal.
(7) Coaling engines.
(8) Replacing work train for spotting cars around company shops and yards.
(9) Handling heavy material at locomotive shops with or without magnets.
(10) Handling wheels and axles, mounted or unmounted in varying amounts at car shops and other locations.
(11) Dismantling and removing from trucks old condemned cars.
(12) Handling timber in the storehouse lumber yards.
(13) Handling pig iron and scrap by magnets at outlying points where regular electric gantry cranes are not installed.
(14) Unloading coal at stations and other company buildings.

bridges are very heavy and difficult to handle by hand but they are handled quickly and easily with a crane. In hanging transfer bridges, a set of heavy girders are erected on timber legs, a proceeding that was not only difficult when done by hand but consumed considerable time and at a large expense. A crane now swings these large girders up on the legs where they are fastened together at a great reduction in time and money, All gears, frames and motors, etc., are handled similarly.

About seven of the Lehigh Valley's cranes are equipped with steam hammers, an arrangement which gives a greater degree of flexibility when pile driving is necessary. An example of this is the Newark Bay trestle where there are many ice breakers close to the trestle proper. It is impossible to get a water pile driver in close enough to drive fender piles between the ice breakers and the trestle. In order to avoid placing a land driver out on a temporary trestle to drive these piles, a locomotive crane with steam hammer and leads is used with good results.

We are indebted to G. L. Moore, engineer maintenance of way, his staff at headquarters and the division engineers of the Lehigh Valley for information contained in this article.

Bureau of Safety Ascribes Accident to Pier Failure

THE BUREAU of Safety of the Interstate Commerce Commission has issued a report on the derailment of a passenger train on the Louisville division of the Pennsylvania System near Edinburg, Ind., on September 17, 1921. The engine, tender and first car of the train were carried into the Blue river with the two spans of the bridge. Officers of the railroad ascribe the accident to the failure of a bridge span as a consequence of damage done to the spans through the derailment. J. E. Howard, engineer-physicist of the Bureau of Safety, disagrees with this conclusion, it being his belief that the bridge was destroyed as a result of the failure of a part of the pier supporting the ends of the two spans. An abstract of the report follows:

The bridge was 259 ft. in length and was composed of two through pin-connected truss spans, each 126 ft. 3 in. long, which were erected in 1892. The substructure consisted of a stone abutment at each end and a pier at the center, of native limestone, built about 1854; no masonry repairs have been made since new coping or top courses were placed in 1892, except one stone placed in 1916. The center pier extends about 12 ft. above normal low water; it is 22 ft. long, 14 ft. wide at the base and 7 ft. wide at the top.

The fireman testified that the front truck of the tender derailed before reaching the bridge, and called to the engineman to shut off. The conductor had no idea as to the cause of the accident.

Report of the Engineer-Physicist

The accident is believed to have been due to the failure of the center pier of the bridge. Officially, the Pennsylvania railroad reached a different conclusion, namely, that "the accident was due to a derailment of the tender from cause unknown."

The derailed portion of the train was thrown or dragged to the east of the center line of the track. Both spans of the bridge fell and were partially overturned toward the east; that is, on the side of the demolished part of the center pier. The combination car stood at an angle with the center line of the track with its forward end several feet to the east. The mail car was on its side, still farther to the east. The mail car and tender were somewhat enmeshed in the trusses of the south span of the bridge. The engine occupied the space between the batter posts of the north and south spans.

Concerning the cause of the accident as it was reached by the officers of the Pennsylvania (that the accident was due to a derailment, cause unknown), supporting evidence seems to be primarily wanting in respect to there really being a derailment prior to the overturning of the bridge.

Officials of the railroad expressed themselves as follows:

The superintendent of the division (assuming there had been a derailment) said he had no opinion as to what caused the derailment. The division engineer was unable to find any cause for the cars leaving the track. He did not believe the engine was off the track; he stated that the mail car, in passing over a distance of 160 ft., got off the center line of the track to the east some 5 or 6 ft.; that the first four bridge ties were either badly chewed up or missing, and that ties beyond the fourth showed no wheel marks.

The supervisor found no marks of wheel flanges on ties of the south span of the bridge. He did not know what caused the accident. The master carpenter found the two south panels of the bridge smashed a little, but with no wheel marks on them.

The testimony of these officials confirm the deduction that the cause of the derailment was unknown, provided there was one, and go still further, appearing to show there was no derailment. On the other hand, the fireman of the train involved in this accident testified that the front truck of the tender was off the track. The absence of wheel marks on the bridge ties refutes the statement of the fireman.

Apparently the masonry support of the bridge spans at the east end of the pier gave way and the engine, tender and mail car slid off into the water as the trusses partially overturned, and in doing so dragged the cars of the rear portion of the train easterly with them. While being dragged over eastward, the mail car, it is believed, came into contact with the southeast batter post of the south span and destroyed it. The forward end of the combination car was also dragged easterly. The east rail of the track approaching the bridge was overturned in an easterly direction. The dragging of the train easterly as the bridge overturned accounts for this condition of the east rail.

Concerning the structural condition of the center pier prior to the accident, it appeared to have reached a state of partial disintegration, which weakened it and led to its failure. This pier and the abutments of the bridge were built in the year 1854 of native limestone. During the long intervening period of time certain of the ashlar face stones, in both the abutments and pier, were broken into small fragments by exfoliation. Stones thus partially broken are deficient in strength, attended with a loss in bonding power between courses. In addition to the structural state of the ashlar masonry occasioned by its exfoliation, the upstream end of the pier showed other unsoundness. An interior pocket filled with mud was exposed to view, located above the mean level of the water of the creek, but below that of high water.

The most plausible explanation of the accident places the responsibility upon the condition of the upstream end of the center pier. Its failure would account for the series of events which followed. The condition of the masonry of the abutments and the standing portion of the center pier lead to the conclusion that the cause of the accident was the structural weakness and failure of the upstream end of the center pier to support the load.

Starting the Spring Drive at a Western Tie Camp.

Tie Production Is Now Twenty-five Per Cent of Normal

Reports Indicate Few Orders and Limited Operations in Woods. Recent Operations More Favorable

THE RANGE of the fluctuations in the demand for railroad cross ties was indicated forcibly by the contrast between the sentiment prevailing at the annual meeting of the National Association of Railroad Tie Producers a year ago and that observed at the convention of this association at the Hotel Sherman, Chicago, on January 26 and 27. During the period preceding the convention of a year ago the production of ties had been at the maximum; during the past season the output decreased to less than half and in some areas to less than 25 per cent of normal. As a result many of the larger producers of ties have closed down operations and disbanded their organizations. While this rapid change is in part the result of over-production in 1920, it indicates that a shortage will occur if the roads enter the market with any considerable demands this year because of the interval which must elapse between the placing of orders and the delivery of ties in most regions.

The Chief Concern One of Readjustment

The association, which comprises among its membership the producers of more than half of the cross ties of the United States, devoted most of its attention to the consideration of the problems of readjustment brought about by this marked decrease in demand, accompanied by the reduction in prices to approximately half of those prevailing a year ago. In the absence of the president, Charles R. McCormick (Chas. R. McCormick & Co., San Francisco), the sessions were presided over by J. H. Johnson (B. Johnson & Son, Richmond, Ind.).

A special feature of the program of the convention which is of particular interest to railway men was the resumé of conditions existing in the principal tie producing areas of the country, from which the following is abstracted:

In Virginia, West Virginia and southeastern Ohio, the railways largely withdrew from the market late in 1921. As a result production has been curtailed until it is not over 20 to 25 per cent of normal in Virginia at the present time and not in excess of 35 to 40 per cent in West Virginia.

In the oak and hardwood territory of Kentucky and Tennessee almost no ties were cut in 1921, although a few scattering lots of ties of 1920 manufacture are still on hand. Recently some of the railroads have resumed limited purchases under contracts or along their right-of-way, but the demand is limited. Under these conditions tie contractors are buying only those ties which can be obtained cheaply and with little effort, practically shutting off production in the more remote areas.

Production in the south central states is now somewhat below normal, although it can be easily stimulated to double what it now is in the cotton-producing sections, where the crop is almost a failure. The demand for ties has been below normal up to the present time, although recently a number of roads have come into the market and the indications are that the demand will be practically normal during the spring and summer.

In the woods of northern Wisconsin and Minnesota the ties produced during the winter of 1920-21 are well cleaned up. Production in this area is largely on the basis of contracts placed in the fall. Last autumn there was relatively little buying by the roads, with the result that there is less activity in the woods this year than for 20

years and the production will not be over 20 per cent of normal, this production coming principally from small farmers, who are cutting ties from their wood lots.

The bulk of the ties produced in the Rocky Mountain region are hewed far back in the mountains and are driven out in the spring freshets. The decreased demand and the marked reductions in prices offered by the roads have led the producers to curtail operations considerably, with the result that the output will be far below normal.

In the Pacific northwest the production of ties has been limited principally to the local requirements. A considerable portion of this demand has been supplied by the small producers who are furnishing hewn ties, the production of hewn ties being greater than for many years. This condition is prompted by the lack of employment in the mills and in the timber camps, forcing the loggers and ranchers having small bodies of suitable timber to turn to the production of ties.

The Shrinkage of Ties in Seasoning

Considerable discussion has arisen at times relative to the extent to which ties shrink in seasoning, this question having been brought to the front recently by the rejection of ties in some instances which have failed to meet specifications with respect to size. Because of this controversy a paper on this subject was presented by Arthur T. Upson of the United States Forest Products Laboratory, Madison, Wis., of which the following is a brief abstract:

Seasoning of ties means ridding the wood of part of its moisture. This can be accomplished either by allowing the ties to stand in the open air or by subjecting them to artificial drying conditions, as in dry kilns. When wood is subjected to either natural or artificial drying conditions, the moisture content of the wood will finally come into equilibrium with that of the surrounding atmosphere or air. Seasoning takes place in any timber which has been felled or has ceased to grow, but the rate of drying varies with many factors, among which are the time of year when cut, species of wood, size and form of pieces, climate and degree and manner of exposure.

The rate of seasoning for various species of wood and for wood in various sizes and forms varies greatly. It is evident, of course, that the size of the piece influences the time required for seasoning, because it affects the relation of the volume of the timber to its surface area and the distance which the moisture on the interior must traverse to escape from the surface. This applies to ties especially.

The governing conditions show that the term "air dry," when used to indicate the amount of moisture present in wood, is a very indefinite one. They also show that no general rule can be drawn as to how long ties should be allowed to season in order to reach a specified moisture content. It is usually considered, however, in research work and to some extent in commercial practice, that by "air dry" is meant a moisture content of from 12 to 15 per cent.

Considerable drying and loss in weight occur in green ties before the wood is capable of shrinking, that is, before the fiber saturation point is reached. Only after the fiber saturation point is reached does shrinkage start, and the amount of subsequent shrinkage varies directly with the loss of moisture from the wood. This uniform rate of shrinkage and moisture loss can exist only under ideal conditions of drying, which conditions do not ordinarily occur in the case of cross ties on account of the presence of defects, encased knots, etc.; the seasoning in larger sizes; too rapid drying at first and subsequent casehardening; lack of ideal drying conditions, and similar influences.

Shrinkage longitudinally, that is, lengthwise of the tie, is so slight as to be negligible. Therefore, in the manufacture of ties it is possible to entirely disregard the shrinkage in length. Shrinkage parallel to the annular rings varies from 1.2 to almost 3½ times as much as shrinkage crosswise of the rings. This indicates that consideration must be given to the tie's original position in the tree in making allowance for shrinkage. But even though a difference in radial and parallel shrinkage does occur, shrinkage from a green condition to the ordinary air dry condition for ties is not great when compared with the variation allowed in specifications for well manufactured ties. The cross tie specifications drawn up by the Tie Producers' organization provide for an allowance of ¼ in. either way in thickness and in width. This allowance is sufficient in a majority of cases to cover shrinkage in usual air seasoning to a moisture content of, say, 20 per cent.

Considerable discussion followed the reading of this paper. In reply to a question, Mr. Upson answered that under ordinary conditions a 6 in. by 8 in. oak tie would probably not shrink more than 1/6 in. in seasoning. Responding to another question with reference to the effect of rafting upon the life of ties, Mr. Upson stated that the shrinkage of ties which have been floated in streams is generally less than that of other ties. This conclusion of Mr. Upson's was verified by the experience of the Union Pacific, that road using ties almost entirely obtained by rafting and considering them superior to land-transported ties of the same species.

The Care of Ties Prior to Treatment

An interesting discussion was instituted on the care of ties prior to use or treatment, this subject having been suggested by the purchasing agent of one of the large railroads and made one of the scheduled items of the program. In opening this discussion, E. E. Pershall (T. J. Moss Tie Company) told how a certain shipment of ties made for treatment had been stacked on end with the result that water had worked up through the pores of the wood to such an extent as to require entire reseasoning before treatment could be made. "Most of the losses in ties," Mr. Pershall said, "result in the methods of stacking, which either do not allow proper seasoning of the wood or expose the tie to the very influences, such as moisture, high temperature and food supply, which augment decay."

Mr. Pershall pointed out that proper attention in piling is particularly essential in the south, to illustrate which he stated that while beech and maple of the north usually give an advance indication of decay in time to prevent their destruction, in the south the wood is often found decayed completely without having given warning of its condition. Aside from improper stacking of ties, losses are regularly encountered by railroads, he pointed out, by improperly stacking along the right-of-way and leaving them lie for extended periods on embankments. Referring to gum wood and the prejudice entertained by railroads for this material, Mr. Pershall stated that 95 per cent of the trouble with these ties is attributable to improper care after they are made and that if such ties are properly taken care of after cutting and prior to treatment, they make excellent timber for cross ties.

C. M. Taylor (C. R. R. of N. J.) stated that while his road is buying gum ties this year, all purchases are made on a rigid specification requiring that such timber be cut in the winter and delivered not later than February 15. The gum tie, he said, makes a very satisfactory tie, providing it is winter cut and so handled as to prevent the decay to which untreated gum ties are so susceptible, and that tie producers can overcome much of the prejudice which railroads have for such ties by ascertaining exactly

just how to handle such timber. The reason for requiring the cutting of such timber in winter, Mr. Taylor pointed out, is due to the unfavorable conditions which winter sets up for the growth and development of the wood-destroying fungi.

Passing on to the question of the proper methods of taking care of ties before their acceptance by the railroads, Timmons Harmount (Harmount Tie & Lumber Company) contended that tie producers should not depend upon the quick movement of their products by the railroads after they have been delivered to the right-of-way and in reply to the contention of D. Webber (Abeles & Taussig Tie Corporation) that the railroads provide insufficient room at sidings, Mr. Harmount contended that whatever conditions are encountered, tie producers should nevertheless adapt themselves to them. He pointed out particularly the importance of educating the small tie producer regarding the proper way of handling the ties which he delivers to the roads.

Mr. Pershall suggested the following: (1) That gum, beech and maple should not be accepted unless cut in winter. (2) That after ties are made they should not be allowed to lie in weeds, and should be hauled in the winter. (3) That where side track facilities are inadequate ties should be shipped immediately to treating plants, where facilities are usually available for the proper sorting and seasoning of such timber.

Election of Officers

Following the presentation and discussion of the various papers, the association entered upon a business session in which it was decided to hold the next annual meeting of the Tie Producers' Association during the same week as that of the Wood-Preservers' Association, which meeting is to be held at New Orleans next year. The following officers were elected for the ensuing year: President, J. H. Johnson, B. Johnson & Son, Richmond, Ind.; first vice-president, Timmons Harmount, Harmount Tie & Lumber Company, Chillicothe, Ohio; second vice-president, H. M. Cochran, Union Lumber Company, San Francisco, Cal.; secretary, Warren Nixon, Western Tie & Timber Company, St. Louis, Mo., and treasurer, R. E. McKee, Long Bell Lumber Company, Kansas City, Mo.

Track Inspection Awards on the D. L. & W. and the Erie

IN CONFORMITY with previous practice on the Delaware, Lackawanna & Western and the Erie, annual track inspections were recently made on both of these roads and awards made to the prize winning sections. On the Erie the inspection was made with a specially constructed motor car which records low joints, gage, cross sections, lurches, time and location. The general appearance of each man's territory and the cost of maintenance were also taken into consideration. The prize winners received the payment vouchers prior to the Christmas holidays, in addition to which a prize section sign was erected on the section winning the prize. In addition to these, there was allocated to each region a grand section prize for the best section on the region and a grand prize section sign was erected on the winners section. The list of prize award winners and the amounts received for the season 1921 were as follows:

Erie Prize Winners

Division	Name of Foreman or Supervisor	Amount
New York	F. J. Stewart, supervisor	$200
New York	C. A. Joyce, supervisor	100
Terminal	M. Deniff, supervisor	100
Terminal	E. J. Dwyer, supervisor	100
New York	C. A. Joyce, supervisor	100
New York	J. Carr, supervisor	100
Terminal	J. D. Carmelo	125
New York	T. English	100
New York	F. Vacca	50
N. Y. S. & W.	D. F. Corcoran, supervisor	100
N. Y. S. & W.	D. F. Corcoran, supervisor	100
N. J. & N. Y.	S. Scavera	100
Greenwood Lake	A. Blondina	50
N. Y. S. & W.	P. Johnardo	100
N. Y. S. & W.	P. Heffron	50
Buffalo	J. H. Lynch, supervisor	200
Susquehanna	W. E. Stenson, supervisor	100
Allegheny	M. J. Cooney, supervisor	100
Delaware	C. A. Buch	125
Delaware	C. Metzger	100
Delaware	J. Gilleran	50
Wyoming	A. J. Bushweller	100
Wyoming	A. E. Bartlow	50
Susquehanna	J. Borruso	100
Susquehanna	J. Cannon	50
Allegheny	R. Crawford	100
Allegheny	W. F. Worrell	50
Buffalo	C. Kingsley	100
Buffalo	H. Weccheider	50
Rochester	E. Trenholm, supervisor	100
River Line	W. D. Van Dyke	50
Bradford	F. Nuttzo	25
Rochester	A. Swartout	100
Rochester	H. Dougherty	50
Tioga	F. L. Pierce	50
Niagara Falls	H. Smith	50
Mahoning	P. H. Cunningham, supervisor	200
Kent	N. E. Scribner, supervisor	100
Mahoning	P. H. Cunningham, supervisor	100
Kent	C. D. Hoffman	125
Meadville	William Bomberry	100
Meadville	M. G. Groover	50
Mahoning	J. King	100
Mahoning	P. Anastio	50
Kent	J. Stirp	100
Kent	F. Cardone	50
Marion	A. Burgett, supervisor	200
Marion	J. Demler	125
Marion	C. Yates	100
Marion	W. F. Johnson	50
Cincinnati	W. P. Smith	100

Following its customary methods, the Delaware, Lackawanna & Western awarded first prize men $100 in cash and a silver medal. Second prize men received $50 in cash and a silver medal, while both classes of winners also were given a marker for their sections. The efficiency men were awarded an efficiency sign for their sections and $10 per month extra compensation in addition to the regular salary, the men to remain on the efficiency list as long as the sections are maintained in the same high state. The men who received the awards are as follows:

Lackawanna Awards

Morris & Essex, East Division—Efficiency, John H. Hall, Denville, N. J.; first prize, A. J. Johnson, Harrison, N. J.; second prize, S. Albert, Chatham, N. J.

Morris & Essex, West Division—Efficiency, E. Morgan, Blairstown; N. J.; P. Tozzi, Portland, Pa.; first prize, L. Santis, Hackettstown, N. J.; second prize, J. Morgan, Johnsonburg, N. J.

Maine Line, Southern Division—Efficiency, W. Sutton, Mt. Pocono, Pa.; J. Kocella, Pocono Summit, Pa.; first prize, R. McDonald, Moscow, Pa.; second prize, H. Sholer, Cresco, Pa.

Main Line, Northern Division—First prize, J. Fernan, New Milford, Pa.; second prize, C. Alise, Hallstead, Pa.

Buffalo, East Division—Efficiency, T. Carey, Painted Post, N. Y.; J. Green, Savona, N. Y.; first prize, L. Pedro, Litchfield, N. Y.; second prize, Albert Wicks, Campbells, N. Y.

Buffalo, West Division—Efficiency, J. C. Keating, Wallace, N. Y.; first prize, J. Smith, Cohocton, N. Y.; second prize, W. J. Mastin Groveland, N. Y.

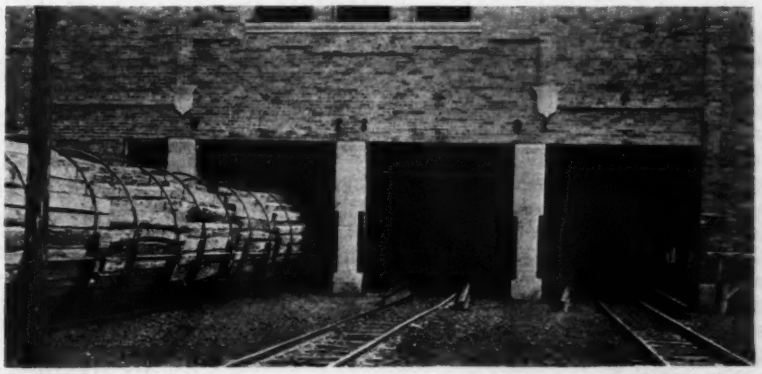
Bloomsburg Division—Efficiency, R. Shingler, Espy, Pa.; D. Blizzard, Danville, Pa.; first prize, G. Thomas, Shickshinny, Pa.; second prize, L. Miller, Northumberland, Pa.

Syracuse Division—First prize, D. Cipriani, Homer, N. Y.; second prize, J. Halloran, Whitney Point, N. Y.

Utica Division—Efficiency, R. Crush, Hubbardsville, N. Y.; first prize, J. Moran, N. Brookfield, N. Y.; second prize, William Locantro, Sherburne, N. Y.

Timber Treatment Promotes Economy in Maintenance of Way

American Wood Preservers' Association Discusses the Preservation of Railway Ties and Other Materials



THE INTIMATE relation which exists between the wood preserving industry and its principal consumer—the railways—was particularly evident during the eighteenth annual convention of the American Wood Preservers' Association, which was held in the Hotel Sherman, Chicago, on January 24 to 26, inclusive. Not only were the more common problems of tie supply and treatment discussed, but attention was also paid to newer developments such as the preservation of car sills and decking. Over 200 members and guests were in attendance at the meeting. C. M. Taylor (superintendent of timber preservation, C. R. R. of N. J.-P. & R.), president of the association, presided.

The convention was opened by an address by R. H. Aishton, president of the American Railway Association. Prefacing his address with a brief reference to the responsibility of the railroads to the public as evidenced by the Transportation Act, Mr. Aishton referred to the fact that over 90 per cent of all of the timber treated in the United States and Canada is for railway use as an answer to the charges of waste which have been made against the railroads. This fact is a "tremendous tribute," he said, to both the association and the railroads, for, on the one hand, it furnishes an indication of the accomplishment of the association, and on the other hand both the enterprise of the railroads in comparison with other industries and the diligence with which the roads are performing the "great public duty" of conserving the country's forests.

Following Mr. Aishton's address and the presentation of the report of the secretary-treasurer in which it was announced that the membership had experienced a net gain of 36 during the past year and now comprises 409 members, C. M. Taylor, president, referred to the work of the association during the past year and to some of the problems now confronting it. "The association," Mr. Taylor said, "must keep in mind the necessity of constantly improving its products and constantly branching out into a larger sphere of study and service. It is to be remembered in this connection that no industry that relies solely on past performance can live." In view of this he pointed out that the association might well inquire of itself whether it is using the proper preservative oils to the best advantage.

At the invitation of the Western Society of Engineers, the Wood-Preservers held a joint meeting with the Western Society at the rooms of the latter in the Monadnock building for the presentation of a paper by A. F. Robinson, bridge engineer of the Atchison, Topeka & Santa Fe, Chicago. This paper outlined the long experience of the Santa Fe with the use of treated timber in ballasted floor trestles. This paper appears in abstract on another page of this issue. The members of the Wood-Preservers' Association also participated in the meeting of the National Association of Railroad Tie Producers, which was held on the afternoon of Jan. 26 and throughout Jan. 27.

Abstracts of those papers and reports of committees which are of special interest to railway men in the maintenance of way department are given below:

Should Cost of Treating Ties Be Charged to Maintenance?

By Earl Stimson

Chief Engineer Maintenance, Baltimore & Ohio

THE INTEREST of the wood preserver in this question is only insofar as it affects the railroad's purchasing power. The degree of that purchasing power depends upon the funds available. These funds can be obtained in two ways, either from moneys earned or from moneys borrowed. The relative desirability of these ways, from the railroad standpoint, depends upon the degree of prosperity of the road or the state of its credit. If the earnings are large, it is desirable to put a portion back into the property and in what better way can it be returned than to invest in treatment for prolonging the life of ties. If the earnings are low, resort to capitalizing of the excess cost of the ties due to the treatment would be a means of meeting the expense. The road of low earning power would likely have poor credit and consequently difficulty in securing the necessary funds.

The manner of providing for this expense, however, has been prescribed by the Interstate Commerce Commission. Under Account No. 8—Ties, of the Classification of Investment in Road and Equipment, Issue of 1914—we find in this connection mention made only to including "the excess cost of metal ties used in repairs of track over the cost to replace in kind wooden ties removed." Under Account No. 212, Ties—Classification of Operating Revenue and Operating Expenses of Steam Roads, Issue of 1914, we find: "This account shall include the cost of cross, switch, bridge and other track ties used in the repair of tracks." Note "B" under this account states that, "The excess cost of metal ties applied in the place of wooden ties over the cost at current prices of replacing in kind the wooden ties removed shall be charged to road and equipment account No. 8, Ties."

While no specific mention is made of treated ties, it is plainly evident that the commission does not consider the treatment of ties a "betterment" in the sense in which

that word is defined by the commission. Such definition is given as: "Betterments are improvements of existing facilities through the substitution of superoir parts for inferior parts retired, such as the substitution of steel-tired wheels for cast wheels under equipment, the application of heavier rail in tracks, and the strengthening of bridges by the substitution of heavier members. The cost chargeable to the accounts of this classification is the excess cost of new parts over the cost at current prices of new parts of the kind retired."

The argument may be put forth that if the substitution of a metal tie for a wooden tie is a betterment, why is not the substitution of a wooden tie which has had the length of its serviceability increased by chemical treatment also a betterment. This may be answered by stating that there is no reason why the treatment should not be classed as a betterment, as the treatment undoubtedly makes the treated tie superior to the untreated tie, as far, at least, as its life as measured by its resistance to decay is concerned. On the other hand, it may be answered that there is sufficient reason why the treatment should not be classed as a betterment. In the case of the metal tie substituted for a wooden tie, there is unquestionably a substitution of a superior part for an inferior part, as the tie is made of a radically different and structurally superior material.

The commission evidently considers a wooden tie as a wooden tie, whether of soft or hard wood—whether untreated or treated. A wooden tie structurally is no better after treatment. It will carry no greater load and will not hold the spikes better. Under severe usage it will resist rail and spike cutting and other forms of mechanical wear no better unless specially protected with tie plates and screw spikes at considerable additional expense. Under very severe usage the treated tie is destroyed as quickly as the untreated tie. The increase in the length of life of the treated tie is the only point upon which its superiority can be based. The same point can be raised in favor of the white oak or long leaf yellow pine tie, substituted for a red oak or short leaf pine tie.

There are many kinds of treatment, varying widely in cost and effectiveness, the effectiveness not always being in direct ratio to the costs. The effectiveness of treatment varies also with the kinds of wood. It is difficult after a few years to identify a tie being removed from the track as a treated or untreated tie, and if the former, the process of treatment used, unless a very elaborate record and method of marking for identification is initiated concurrent with the authority to charge the cost of treating to Investment in Road, that is, to Capital Account. Otherwise it would be impossible to separate the charges accurately.

The rapid rise in the price of timber has increased the price of the tie in much greater proportion than the cost of treatment has increased. Less expensive treatments, that have been found adequate, are being used more and more in place of the more expensive treatments formerly considered necessary. The result has been that the ratio of the cost of treatment to the price of the tie has decreased greatly, making the use of treatment not only show greater economies but also reducing the proportion that the excess cost of treatment bears to the total cost of the treated tie. This should in itself stimulate the use of treated ties and not make necessary resorting to the doubtful expedient of capitalizing.

The steady increase of the use of treated ties, until now a large percentage of the ties used are treated, rather nullifies the idea that the present method of charging out the cost of treatment to maintenance is preventing a more liberal use of treated ties. Nor does it appear that the charging to investment in road, that is, capitalizing, the excess cost of the metal tie has brought about the extensive use of that tie, or made it even a competitor of the treated tie. Millions of treated ties are used to thousands of metal ties.

The writer has treated this subject, not from the standpoint of the accountant or the financier, but rather from that of the maintenance engineer. He has cheerfully taken into his maintenance costs the expense of treating some 12,000,000 ties to date. He is even now reaping to no inconsiderable extent the full benefits of the price paid. He is not and will not be compelled throughout all time to give up some portion of those benefits in the payment of interest charges, or in other words, to pay tribute to capitalizing. The writer favors the present practice of charging the cost of treating ties to maintenance.

The Economics of Treated Ties

TWO PAPERS were presented on the cost of treated ties. In one, V. K. Hendricks compared the three methods commonly used to determine the annual cost of maintaining ties in track, one eliminating consideration of interest, another computing the cost on the basis of simple interest and the third using compound interest. Mr. Hendricks discussed these methods at length, demonstrating that the third method is the accurate one and therefore advocating its use for all computations wherein an effort was being made to arrive at the annual cost of treated ties when considering the relative economies of treated or untreated ties or for other purposes.

An abstract of the second paper discussing the factors affecting the cost of treated cross ties, by E. E. Pershall, vice-president, T. J. Moss Tie Company, St. Louis, Mo., follows:

The purchase of timber to be used for conversion into cross ties is largely made in two general ways, i. e.: 1. The purchase of land and timber in fee. 2. The purchase of timber only on certain described lands.

The land values on which the timber may be standing have a very direct bearing on the cost of stumpage, as timber land having a relatively high potential value for farms or ranges, in most cases carries with it taxes that are very closely related to its future use.

Values of timber and timber lands, as may be used for the manufacture of cross ties, are in most cases determined by experienced timbermen, who are not only expert at estimating the amounts of the various kinds of timber standing, but, much more important, the numerous considerations involved in the profitable removal of the timber from stump to river bank or railroad. The amount of labor in the immediate territory available for making and hauling ties, the character and topography of the timberlands, which always affects most directly the amount of the standing timber that will actually be removed at a reasonable cost, the length and character of the haul to the railroad or river bank; the cost of driving, rafting or barging from river bank to railroad, where necessary; and the freight rates from prospective shipping points to certain large rate basing points, such as St. Louis, Kansas City, Chicago, etc., all enter very pertinently into the proper valuation of a profitable timber investment.

In the Mississippi Valley territory the stands of virgin oak timber rarely cut out over one hundred 6 in. by 8 in. by 8 ft. ties per acre on the average, and in the majority of instances an actual production of 50 oak ties per acre is considered a very good average. Cypress brakes, when converted exclusively into cross ties, will cut out a much larger average number of ties per acre than oak, but cypress trees of the larger diameter are generally valued

by lumbermen at higher prices than the tie man can pay.

Prior to the existence and general acceptance of the cross tie specifications of the United States Railroad Administration, a very substantial amount of standing timber of such species as hickory, ash, elm, maple, gum and pine, that always grew on timber lands together with white and red oak, were left standing, in many cases, to the ravages of decay, fires, winds or the girdling of the future farmer. The general sale and purchase of cross ties on the basis of fair values for the various species enumerated, or better still, classified under the U. S. R. R. A. specifications, has done much good toward the conservation of timber through prompting the timely conversion of species other than oak into cross ties rather than allow a very substantial percentage of good, sound trees of these species to lapse into the category of cut-over lands and thereafter to eventual waste.

Manufacture of Cross Ties

The manufacture of cross ties, after felling the tree and cutting the bole into eight foot or multiple logs, is accomplished by hewing or sawing. In making hewn ties, logs over 14 in. in diameter are split, by means of tie wedges, into two, three, four or more sections, roughly dimensioned for hewing with a broadaxe into cross ties. Logs under 14 in. in diameter may be hewn on two faces, and sometimes on two sides, into one of the five grades of cross ties provided in the specifications. For example, for logs perfectly round and straight:

12 to 14 in. diameter logs may be hewn to	7x9	Grade 5
11 to 12 in. diameter logs may be hewn to	7x8	Grade 4
10 to 11 in. diameter logs may be hewn to	7x7 6x8	Grade 3
9 to 10 in. diameter logs may be hewn to	6x7	Grade 2
8½ to 9 in. diameter logs may be hewn to	6x6	Grade 1

The hewing of cross ties is at best but a rough woodworking operation that cannot, in the majority of instances, be carried on within a restricted tolerance of dimensions, and a broadaxe in the hands of a steady and skilled tie maker must sometimes deviate from straight lines and parallel faces. An attitude of appreciation of these unintentional slips of the tie maker's broadaxe on the part of the railroad inspector who ultimately grades the cross ties for the basis of invoice is called "the exercising of some judgment" by the majority of our best tie men, but the justification therefor does not by any means meet with universal approval.

Sawed Tie Manufacture

The manufacture of cross ties by sawmills is generally done in the Mississippi Valley territory by the use of so-called "portable tie mills." After the tree is felled and bucked into logs, teams and log wagons haul 3 to 5 logs per load to the mill set, where they are later sawed into cross ties and one inch lumber, commonly called "tie siding." The price obtainable for this tie siding is a very important factor affecting the cost of the cross tie, but fortunately, or unfortunately, as the case may be viewed, the prices for tie siding are always highest when cross ties are finding a ready market, and the siding can hardly be sold at all when cross tie prices are depressed.

During periods when the roads become impassable, or when teams are difficult to obtain, hewn ties are not always hauled out of the woods in time to prevent deterioration and loss. These losses are mainly due to ground fires, high water, and as much as anything else to the sap rot that all too frequently attacks a cross tie, if left lying on the ground, surrounded and partly covered by weeds and underbrush in a warm, swampy country.

The tie man is indeed fortunate if the total number of ties shown as "made" on pay roll accounts check out favorably with the number of ties shown as "hauled." That such eventualities directly affect the cost of the number of ties shipped must be clearly apparent.

Hauling of Cross Ties

The hauling of cross ties out of the woods when hewn, or from mill yards where sawed, is accomplished in the majority of instances by teams and wagons. All cross ties are hauled either to a railroad right of way for inspection and loading or to a river bank for driving, rafting or barging to a railroad some distance away from the point of production.

The mode of transportation by water depends largely upon the character of the stream to which the ties have been hauled. On comparatively small, clear, shallow streams ties may be driven, that is, rafted singly, to the greatest advantage. Some notable tie drives, running into hundreds of thousands, are those on Wind river in Wyoming, and on the Black river in Missouri. On streams where the water is not clear, or the depth is too great for driving, but where not deep or wide enough for barges and steamboats, the ties are made up into rafts.

The losses in this water transportation are obviously large and are avoided by barging the ties from river bank to railroad on those streams where barges and towboats may operate. Here the ties are skidded in chutes from the river bank into barges holding from 2,000 to 10,000 ties. A tow of from 3 to 7 barges is made up and guided downstream in most instances by a steam-operated towboat to some river port giving connections with a railroad.

The maintenance of towboats, barges, etc., is a costly venture wherein the unit costs of towing per tie are dependent largely upon four major items, viz.: fuel, labor, repairs and the number of ties hauled with a given investment in equipment. The great common denominator of the volume of business handled with a given fleet of boats and barges plays quite an important part in the unit costs of towing.

Ties reaching a railroad siding by rafting, driving, barging or hauling are loaded onto cars for shipment very largely by: 1. Tie handlers—manual labor; 2. Endless chain or cable conveyors; 3. Locomotive crane.

Mechanical Equipment Used

Where there is a limited amount of separation of grades and species of timber to be done, and a substantial number of ties are to be loaded, mechanical loaders are generally preferable to tie handlers. In a large majority of instances, however, the handling of ties onto cars for shipment is closely connected, and is in reality a part of the sorting into grades, and where this is to be done a negro tie handler is economically superior to any mechanical devices now in common use.

The cost of loading of course varies largely with the kind of work to be done. For example, ties without any separation as to grades or species may be loaded with a locomotive crane out of the river onto cars for so low a charge as 25 cents per 100 ties, when handled in good volume. From this low extreme, the cost may vary up to 6 or 7 cents per tie for complicated separations as to grades and species and depending upon method of loading employed.

The cost of supervision is obviously greater with the increased complexity of the operations involved and directly proportional to the volume of business handled. Cross ties are usually inspected in the field as loaded on cars for shipment, both for grade and species. There is probably no one element affecting the cost of finished cross ties as much as the matter of inspection. It is unfortunate that the variation in the inspection of cross ties has always been a condition very difficult to anticipate.

Probably the greatest national opportunity for standardization of cross tie inspection was during federal control of the railroads, when all cross ties were being purchased by the roads under the same specifications and standard rules for the application of these specifications, giving variations, etc., were in effect. Yet the difference in inspection on the same kind of cross ties between the regions was so great as to call for many adjustments and compromises. Obviously, the grading of cross ties will never become an exact science, and inspection will, for some time in the future, be a large controlling influence on the cost of cross ties of the various grades, insofar as the inspection determines these grades, after all moneys have been spent in the production of ties.

Treatment

The cost of the preservative treatment of cross ties depends largely upon four items: 1. Labor. 2. Fuel. 3. Overhead, including, among other items, repairs, maintenance and depreciation. 4. Cost of preservative. Unit costs based upon the first three items are inversely proportional to the volume of business handled with any given plant investment.

Selling Arrangements

The sale of cross ties, either untreated or treated, as the buyer may elect to purchase, is generally done by negotiation, and contracts are usually made based upon: (A) Flat price for a specific number of ties, (B) cost-plus arrangements and (C) periodical price adjustments, in line with market conditions.

Method C is but a continuation by mutual agreement of Method A. Method B is self-explanatory as to principle. Cost-plus arrangements have several advantages in avoiding any substantial losses to the manufacturer due to rigid inspection or adverse market fluctuations, but usually requires a system of strictest accounting, which, under certain conditions, may be quite unwieldy.

Report On Peeling Ties

THE PROBLEM of peeling ties is limited to the North Central states. In other parts of the United States ties are delivered stripped of bark. In the North, tie peeling is a serious problem, and the committee has given the following recommendations:

1. Ties should be peeled by the maker. The work of making the tie is not complete until the bark is removed, because the tie is not in a usable condition with the bark on it. The sooner purchasers of cross ties refuse to accept them when only partly made, the better it will be for the tie industry. The work of a treating plant should not be hampered by having to peel ties. Ties should not be seasoned with the bark on. The work of peeling should be done before tie leaves the woods or the mill, as the case may be.

2. When ties are peeled by hand where made, the work can best be done with an axe or a cooper's draw knife. Should the maker elect to hold his ties until the bark can be more easily removed, which in the North is between May 20 and July 15, a spud has been found to be the most effective tool.

3. When ties are made at a sawmill, many of them are square sawed, but in case ties are sawed on two sides only and the bark is to be removed, it should be considered a part of the process of manufacture and removed by mechanical appliances provided for doing the work. Sawmill men advise that this is entirely practicable. It is the opinion of the committee that if an air planer can be utilized, it would be best adapted for use at a sawmill where compressed air is obtainable at the time ties are being made, to aid in the process of manufacture.

4. When necessary to peel ties at a treating plant, the committee recommends that ties be peeled when received at the plant before being piled and that it be done on a piece work basis. The bark should be cleared up daily and used as fuel.

5. It is the opinion of the committee that the elimination of the tie peeling problem is largely in the hands of the railroads and others purchasing ties. It is merely a question of getting the tie producer to do his work properly.

F. S. Pooler (C. M. & St. P.), chairman; W. L. Bacon (C. & N. W.), A. Gibson (N. P.), A. Meyer (Walsh Tie Co.), T. G. Townsend.

Marine Borers in San Francisco Bay

AFTER MANY years of moderate trouble with marine borers, the wharves, docks and other timber structures of the railways and other industries in San Francisco bay were subjected to most severe and extraordinary destructive effects from the boring mollusks during the period of 1917 to 1920. This became the subject of an intensive study by a special committee, whose conclusions are abstracted below.

The study made by the committee covered a wide range of activities and included not only structures built of timber, but of concrete piles and piers encased or otherwise protected. The committee submitted a preliminary report last year, but presents new conclusions this year embodying some modification from those previously given:

(1) Marine borers are very active in San Francisco bay and connected waters, and in places where their attack is severe will destroy untreated piling in as short a time as six to eight months. In other places the untreated piling may last from two to four years.

(2) The information secured indicates that it is reasonable to expect a life of five to eight years from paint and batten protections in sheltered waters, if the work is well done. If it is not well done, or if the covering is damaged by careless handling or if unprotected wood is exposed by mud scour, this range of life cannot be expected.

(3) The data so far in hand indicate that it is fair to expect creosoted Douglas fir piling in San Francisco bay to give a life of 15 to 20 years under present conditions. Certain piles are of authentic record from the Oakland Long Wharf which were sound when removed after a service of 29 years. Poor treatment, or damage to creosoted piling by careless handling, rafting, storage or construction, will materially reduce the life which might otherwise be rendered by such piling.

(4) Most of the attack on creosoted piling by marine borors, which the committee has observed throughout this survey, appears to have begun in spots where untreated wood has been exposed by damage in handling the piles or placing the superstructure. It is urgently recommended that improvements be made in the methods of handling creosoted piles and building structures upon them, so that damage to the surface of the piles may be reduced to a minimum.

(5) Precast reinforced concrete piles and pile casings have not been in use in San Francisco bay a sufficient length of time to determine their ultimate life. A detailed examination of those structures which have been in service for 10 years shows no evidence of deterioration below high water line, and they seem capable of a long further life. The length of life to be expected from this type of construction is largely dependent upon the quality of materials and workmanship and the skill and care with which they are employed, and any laxity in these particulars will materially shorten the length of service which may be secured.

(6) Reinforced concrete cylinders cast in open caissons have been in use for twelve years. Although the average life of many earlier cylinders has been considerably shortened by construction defects, these cylinders with minor repairs still give promise of a long period of service. Similar cylinders designed and constructed in accordance with best modern concrete practice should constitute a type of construction only excelled for longevity by solid fill or mass concrete.

(7) Cast in place concrete pile jackets may be expected to give satisfactory results if properly constructed of suitable materials and proper regard is given toward exclusion of sea water from forms. The difficulties of this type of construction, how-

ever, are of such a nature that the probability of securing a maximum length of life is less than in the case of precast concrete piles or pile casings. (No. 6 in last year's summary.)

(8) Copper sheathed piles have given very satisfactory service in locations where damage from abrasion and theft can be minimized. Such piles carefully prepared and handled fall into the class of best surface protections, when used under the conditions indicated.

(9) The selection of a type of piling or pile protection for a given structure must be made upon the basis of cost and permanence of the materials under consideration, the character of the structure and the probable need for future alterations to meet the changing requirements of commerce. When a comparatively short increase over the life of untreated wooden piling is sufficient, the surface protections will often be found economical in waters not exposed to severe storm action; if a moderately long physical life approximating the average economic life of marine structures in this harbor is desired, a good creosote treatment will provide it at the lowest annual cost so far as present knowledge goes; if conditions warrant building for the greatest permanence, with less regard for first cost, concrete construction has shown a high value in this harbor. For the protection from further damage of wooden piles already in place and showing attack by borers, not yet severe enough to require condemnation, the concrete casing, precast or poured in place, is the only means of salvage so far found by the committee.

Business

THE COMMITTEE on Service Test Records presented a tabulation of 374 records on completed tests on 38 species of timber, involving a total of 923,000 ties untreated and treated with various preservatives and methods. This tabulation is believed to be the most comprehensive which has ever been compiled. In the discussion of this report, George E. Rex (vice-president, National Lumber & Creosoting Company) emphasized the necessity of considering the tie renewals on an entire railway rather than on certain selected test sections, believing these results to be more typical. He stated that the Atchison, Topeka & Santa Fe has in 18 years reduced its renewals annually from 345 per mile to less than 150.

The feasibility of introducing tropical ties in the United States was discussed in a paper presented by Nelson Courtlandt Brown, in which the conclusion was drawn that in view of the lack of information concerning the life of tropical ties in this country, the confusion regarding nomenclature and classification of these woods, the lack of information regarding the relative durability of these woods in their native habitat and the limited information concerning their seasoning qualities, the time has not yet arrived when serious consideration can be given to the securing of ties from these areas.

While the treatment of car lumber is of primary interest to officers of the mechanical department, the presentation of a report and a paper on this subject indicates the growing interest of wood preservers and railway men alike in the possibilities for economy in this direction.

Papers on the more technical phases of timber preservation included one on the Theory of Preservation by Ernest Bateman, chemist, Forest Products Laboratory; one on the Effect of Wood Destroying Fungi by Walter H. Schnell. A committee on inspection presented a paper on the equipment required to facilitate the inspection of treating operations in a plant. Another committee presented a report on pressure machinery, covering the pumping equipment and other facilities necessary to obtain the proper pressure conditions in the retorts.

Closing Business

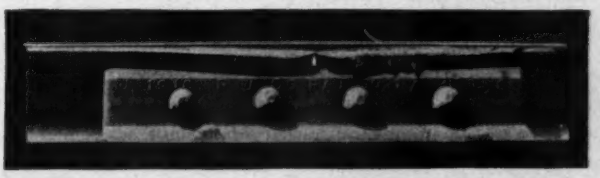
At the closing session on Thursday morning the following officers were elected: President, F. J. Angier, superintendent timber preservation, Baltimore & Ohio, Baltimore, Md.; first vice-president, W. H. Grady, vice-president, American Creosoting Company, Louisville, Ky.; second vice-president, H. S. Sackett, assistant purchasing agent, Chicago, Milwaukee & St. Paul, Chicago; secretary-treasurer, George M. Hunt, engineer forest products, United States Forest Products Laboratory, Madison, Wis. Directors: O. C. Steinmayer, superintendent timber preservation, St. Louis-San Francisco, Springfield, Mo.; E. J. Stocking, vice-president, Central Creosoting Company, Chicago. At a meeting of the executive committee following the convention, C. F. Ford, superintendent tie and timber department, Chicago, Rock Island & Pacific, Chicago, and E. E. Pershall, vice-president, T. J. Moss Tie Company, St. Louis, Mo., were elected directors to fill the vacancies caused by the election of W. H. Grady and H. S. Sackett as vice-presidents. S. D. Cooper, assistant manager treating plants, Atchison, Topeka & Santa Fe, Topeka, Kan., was appointed secretary to succeed George M. Hunt, resigned. New Orleans was selected as the location for the next convention.

Building Up Rail Ends With the Gas Torch

STANDING out prominently among recent developments in maintenance of way practices is that now in extensive use throughout the country of building up worn track work by welding. Frogs and crossings, especially, have received much attention in this direction, while more recently several roads have applied the process also to the building up of battered rail ends as a substitute for the common practice of removing the rails from the track and shipping them to a rail sawing plant where the damaged ends are removed, a practice which involves no small expense, both from the standpoint of the labor charges and of the material wasted, when such work is done at all extensively.

Results on the Santa Fe and Southern Pacific

Favorable results in the building up of battered rails have been obtained on a number of roads, among which are the Santa Fe and the Southern Pacific in California and the Great Northern. On the Santa Fe the work has been done most extensively on the San Joaquin Valley division, a territory in which the battering of rail ends is pronounced. Starting with three crews in 1920, the organization has been expanded to five by the addition of two crews this year. Each crew handles all welding



A Typical Rail Joint Before Welding. This Is 90-Lb. Rail Laid in 1910

work found as it passes over the track, which involves the building up of frogs, switch points, etc., as well as that of rail ends and often includes such jobs as the burning out of the leaded points in a certain pipe line renewal job.

According to the plan by which the crews work, 14 to 18 joints are being built up per day, the work including the building up of the metal to the proper contour, which is done without difficulty, and the renewing of the insulation between the rail ends in all insulated joints. One piece of metal weighing a half pound is sufficient for three or four joints, and the work is accomplished at a cost of approximately $1.80 per joint. This is an increase over the record of the period of experimenting,

but arises from the application of greater care incident to better work. Inaugurated in October, 1919, the work on this road had progressed to a point where over several thousand joints have been repaired. Upon examination these joints give every evidence of holding up in a substantial manner.

On the Los Angeles division of the Southern Pacific the practice of building up rail ends was inaugurated in May, 1920, when three outfits were organized, one spending its entire time in Los Angeles and the other two, with

Building Up a Rail Joint on the Santa Fe

which one helper was employed, remaining on the line. Since that time this organization has built up 10,000 joints in addition to making extensive frog and crossing repairs. During the six months from May to October, 1921, 4,616 joints were built up at a total cost of $5,387, or about $1.16⅔ per joint.

The work which has been done thus far is holding up in an entirely satisfactory manner, not more than 100 joints of the 10,000 built up having broken down, and while several have chipped, the number appears to be no greater nor the chipping worse than found in the case of rail ends upon which no work has been done. This chipping is reduced by cutting the weld at the rail end with a chisel immediately upon finishing the welding operation.

On each of these roads the welders have experimented with different kinds of metal incident to the constant effort to enlarge upon the effectiveness of the work, and on the Southern Pacific the welder operating in Los Angeles has given particular attention to experimenting with the welding on manganese. Although no weld has yet been obtained which will last over two months, it has been found profitable at this point, where a welder is constantly available, to perform such work because of the high cost of manganese construction.

Welding on the Great Northern

The Great Northern's experimentation with welding in maintenance work had its beginning in August, 1919, when a school of instruction in the building up of frogs was organized at St. Paul. At this time one trackman was selected from each of five divisions and all five men were then placed under the instruction of an experienced welder for a month. With this preliminary instruction, each man was then equipped with a complete frog welding outfit and sent back to his division, where, with a helper he proceeded to rebuild the worn frogs found as he traveled from one station to another. The organization of this school at St. Paul was followed by the organization of a school of three men at Hillyard in October of the same year. As a result of these two schools work of building up worn frogs was established on eight divisions.

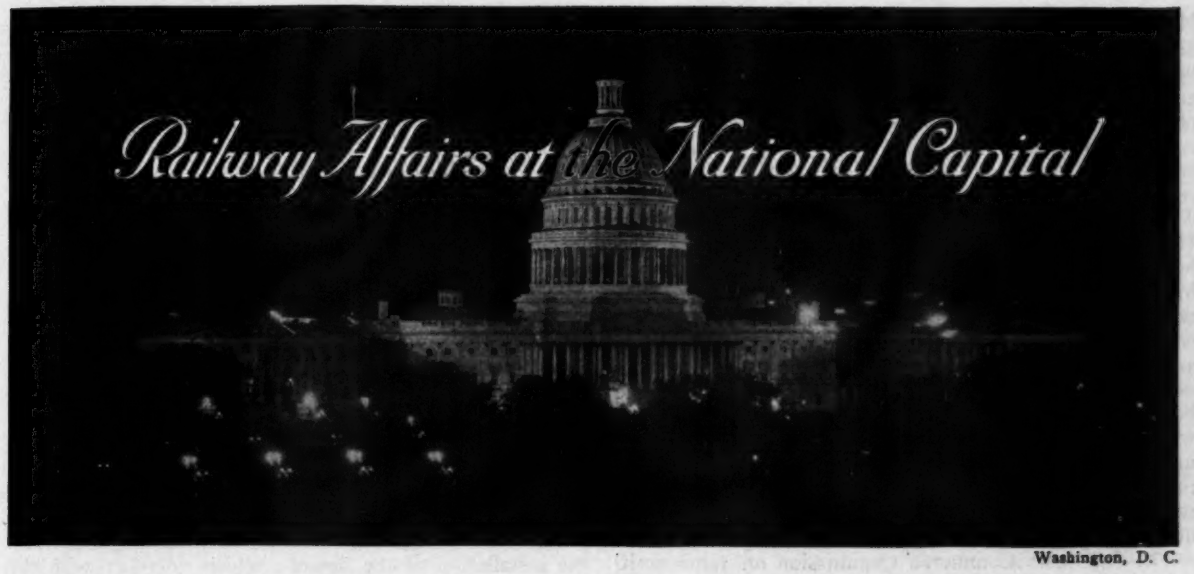
Such was the extent of welding work until October, 1920, when definite steps were taken to building up battered joints. As an initial step 20 joints were built up in Minneapolis and observed for three months. In February, 1921, on the strength of these observations, two crews, experienced in welding frogs, were assigned to rail joint work on the Messabi and Spokane divisions. Since that time a gradual growth has occurred in both frog and joint work until in August 14 outfits were building up frogs and 16 were working on joints.

Most of these 30 outfits consisted of one experienced welder, one helper, having practically the same status as an apprentice, and one laborer; in one instance the nature of the work was such that one helper was able to keep four welders at work. Each gang is provided with two outfit cars, one for living quarters and one for supplies, with which equipment it proceeds over the lines under the direction of the roadmaster. While each crew receives its instructions from the roadmaster, the selection of the proper joints for welding is left to the judgment of the man in charge. The general rule is that all joints which are low ⅛ in. or more shall be built up, although this rule is varied with the character and importance of the line. In order to detect these low joints and to assist the men in obtaining a proper surface of the built-up work, each welder is equipped with a 24 to 30 in. steel straight edge and a tapered wedge graduated to show sixty-fourths of an inch.

Records show these crews to be building up an average of about 350 joints per month each, the performance of the men, as might be expected, increasing as they become more proficient in the work. While the average number of joints which each crew builds up affords a partial indication of the comparative progress made, more reliance is placed upon records of comparative costs, based upon the pounds of metal applied to the joints. The average amount of metal used on most of the 90-lb. rail is 7½ oz. per joint. The cost per joint has been reduced from an early average of $2.30 to $2 and in many localities the figure is considerably lower, recent records in, fact, showing an average performance of 25 joints per day at a cost of $1.29 per joint.

The Creosoted Posts Did Not Burn

THE MISSOURI, Kansas & Texas has used creosoted fence posts exclusively for the past two years for both new construction and renewals, the posts being treated by the pressure process. This results in the treated posts being installed out of face where fence is being rebuilt and spotted in elsewhere. A total of 2,030,911 posts are now in service on the Katy, of which 378,578 are treated and 1,652,324 untreated. During the last season a record was kept of the number of posts burned on the Kansas lines, on which lines the total number of posts in service is estimated at 952,364. Of these 287,559 are treated and 664,805 untreated. A total of 2,212 posts were destroyed by fire on these lines in 1920, of which only 12 were treated. In other words, while the number of untreated posts in service was 2.3 times the number of treated posts, the number of untreated posts burned was 183 times the number of treated posts burned.



Washington, D. C.

THE INTERSTATE Commerce Commission's summary of wage statistics for the month of September, 1921, compared with August, shows an increase of 38,403 in the number of employees as of the middle of the month, while their total earnings decreased $3,773,073. The number of employees was 1,718,330 and their total compensation was $223,972,822. The decrease in earnings is said to be due to the fact that there were 27 working days in August, while there were only 25 in September. The statistics do not include the Detroit, Toledo & Ironton, which had not yet filed its report.

$458,000,000 of New Capital Should Be Spent in 1922

Estimates of the amount of new capital which the railroads of the United States should spend for improvements during 1922 to meet the demands for transportation have been filed with the Interstate Commerce Commission by witnesses for the railroads in response to an inquiry propounded by the commission. The exhibits were based on special reports made by the individual railroads of their requirements for the year. The estimate is not complete, because a few roads filed no reports. For the railroads as a whole the amount required to be spent for additions and betterments chargeable to capital account was placed at $458,280,327, based on the present volume of traffic, of which $192,363,020 would be used for cars and locomotives and $265,917,307 for road and general expenditures. For a normal volume of traffic it was estimated that $400,006,068 additional would be required, including $191,020,991 for equipment and $208,985,077 for road and general expenditures.

For the year ended September 30, 1921, it was shown that the expenditures of the roads on capital account amounted to $365,641,329, of which $164,268,626 was for equipment and $174,442,242 for road and general expenditures. The compilation covering the railroads as a whole and those of the Eastern district was presented by George M. Shriver, senior vice-president of the Baltimore & Ohio. The capital required by the Eastern roads for 1922, according to his exhibit, is $124,654,843, based on the present volume of traffic, and $166,968,892 additional, based on a normal traffic. The capital expenditures for the year ended September 30, 1921, amounted to $121,033,505. For the Western lines the capital required, as shown by the exhibit filed by L. E. Wettling, manager of the statistical bureau of the Western lines, is $248,256,502, based on the present volume of traffic, and $128,534,845 additional, based on a normal traffic, while the expenditures for the year ending September 30 were $185,253,534. The exhibit for the Southern lines, presented by George W. Lamb, placed the requirement for 1922, based on the present volume of traffic, at $85,368,982, while $104,502,331 additional would be required for a normal traffic. For the year ending September 30 the capital expenditures of the Southern lines were $59,354,290.

Only 13 Roads Earned Over 6 Per Cent

Only 13 Class I railroads in the United States (those having annual revenues of $1,000,000 or over a year) had a net railway operating income in excess of 6 per cent on their property investment during the year ended September 30, 1921, according to exhibits filed with the Interstate Commerce Commission in response to an inquiry from the commission in connection with its rate investigation.

The exhibits cover 177 roads, of which 48 had actual deficits for the year, while 159 earned less than the percentage contemplated by the transportation act. The 6 per cent return for the purpose of these exhibits was calculated on the property investment, because the commission has not yet determined the valuation of the individual roads. Of the roads earning over 6 per cent, 7 were in the Eastern district, and their total excess over a 6 per cent return was $3,495,313, while the shortage under a 6 per cent return of the other roads in the East was $327,314,544. None of the roads in the New England district had an excess over 6 per cent, while the shortage for the New England roads was $63,182,716. Six of these roads had deficits, while 8 roads in the Eastern district outside of New England had deficits.

In the Western district 22 roads had deficits, while 6 roads had an excess over 6 per cent, amounting to $12,181,067. The other Western roads had a total shortage under a 6 per cent return of $285,894,406. Of the 31 Southern roads, none had a return of over 6 per cent, while 12 had deficits. The shortage under a 6 per cent return was $107,643,605.

Definite progress toward an amicable adjustment of the differences between the railroads and the brotherhoods of train service employees regarding wages and rules governing working conditions was reached at a conference of railway executives and the heads of the "big four" brotherhoods on January 16 with Secretary

Hoover of the Department of Commerce. It was decided, according to an announcement issued after the meeting by Secretary Hoover, to submit to the railway companies and to the train and engine service organizations the proposal that the pre-war regional conferences should be convened to consider the endeavor to adjust all questions between the railways and the brotherhoods, the conferences to be held as near to February 10 as practicable. This was the second of the conferences called by Mr. Hoover, at the suggestion of the President, to try to bring about an adjustment between the roads and the brotherhoods that would eliminate the danger of an interruption of transportation this spring as the result of a conflict that would be coincident with the wage dispute arising from the expiration of the mine wage contracts on March 31. The first conference, attended by the brotherhood leaders and half a dozen railway executives, was held at a dinner at Mr. Hoover's residence on January 7. The Secretary of Commerce tried to get the railroad and labor leaders onto common ground which would result, if possible, in a settlement without the delay incident to a proceeding before the Railroad Labor Board.

The Interstate Commerce Commission on January 10 served upon 49 railroads an order to show cause by March 15 why it should not adopt a report and enter an order requiring them to install by July 1, 1924, between designated points on their main lines, automatic train stop or train control devices complying with specifications and requirements set forth in the order which the commission has determined upon as the result of its investigation conducted pursuant to Section 26 of the Interstate Commerce act.

The device, according to the proposed order, is to be applicable to or operated in connection with all road engines running on or over at least one full passenger locomotive division included in the part of the main line between the points named. It further provides that each carrier named shall submit to the commission complete and detailed plans and specifications prior to the installation and that by July 1, 1922, they shall file complete and detailed plans of the signal systems in use, a report of the number and type of locomotives assigned to or engaged in road service on the designated portions of the line, and "shall proceed diligently and without unnecessary delay to select and install the devices as specified." They are also to file with the commission on or before July 1 and each three months thereafter full and complete reports of the progress made with the preparation for and the installation of the devices, which, together with the manner and details of the installation, shall be subject to the approval of the commission or the division of the commission to which the matter may be referred.

Activities of the Railroad Labor Board

THE work of the Labor Board during the past month has been only remotely associated with the interests of the maintenance of way department. On January 23 a new national agreement with the clerical forces was promulgated, in which the chief modification embodies the payment of straight time for the ninth hour, instead of time and one-half, and provision for intermittent eight hours actual service any time within a spread of 12 hours. No decision has been reached thus far with reference to the contracting of maintenance work, which was the subject of a hearing in December. The following are the decisions of the Labor Board on minor cases concerning maintenance of way employees which were given out from time to time.

Applying the Seniority Rule When Reducing Forces

In a case brought by the employees' brotherhood against the Southern Pacific Lines in Texas and Louisiana, it developed that when making a reduction in a force of 50 men on a certain section in the San Antonio yard for the purpose of reducing expenses, 10 section laborers were laid off who held seniority rights over certain other employees retained in the service. The question arose as to whether the road had the right, in reducing the force, to lay off these men while retaining those who were juniors in point of service.

The railroad took the position that this rule gives them the right to choose between the satisfactory and unsatisfactory men and showed that the men laid off in this particular case were members of extra gangs who had been put on to take care of temporary conditions of an emergency character and whose services were not satisfactory. It was also shown by the railroad that the men in question worked more or less irregularly and that according to a proper interpretation of the rule regarding seniority they had forfeited any seniority which they might have otherwise established. It was decided that the road was within its rights in reducing forces in the manner outlined. (Decision No. 408.)

Most Favorable Overtime Arrangement Applies

A number of disputes have been presented to the Labor Board regarding the meaning and intent of the following paragraph of Addendum No. 2 to Decision No. 119:

"1. All overtime in excess of the established hours of service shall be paid for at the pro rata rate; provided, that this will not affect classes of employees of any carrier which have reached an agreement as to overtime rates, or classes of employees of any carrier who by agreement or practice were receiving a rate higher than pro rata prior to the promulgation of any general order of the United States Railroad Administration relating to wages and working conditions."

The decision of the board is that the paragraph quoted above shall apply in all cases except where the employees enjoyed a more favorable arrangement prior to the effective date of any supplement to General Order No. 27, or in any case where the employees have obtained a more favorable agreement. Interpretation dated January 14, 1922.

A Separate Agreement for Section Foremen

In a case brought before the board by the Brotherhood of Maintenance of Way and Railway Shop Laborers against the Buffalo, Rochester & Pittsburgh Railway, the question was raised as to whether foremen in the maintenance of way department may have an agreement separate from other employees in that department. Evidence presented in connection with this case showed that certain section foremen had approached the railroad with a request that the foremen be permitted to have a separate agreement governing rules and working conditions, that the company had expressed its willingness to enter into such an agreement, provided the section foremen could show the proper proportion of men in their class, and that a date was set for a hearing of the petition before the general manager. The evidence further showed that because on the date set representatives of the fore-

men and representatives of the maintenance of way organization both appeared before the general manager, each claiming the right to negotiate the agreement, it was decided to take an independent secret ballot among foremen to ascertain their attitude in the matter.

These ballots were prepared and approved by representatives of both the foremen's and the maintenance of way employees' organizations and were distributed by a representative of the railroad, together with representatives of both the foremen's and maintenance of way employees' organization. As a result of this vote, which was counted and checked by representatives of both organizations, it developed that the foremen's organization had received the majority of the votes cast. The brotherhood then alleged that intimidation had been exercised on the part of the road in connection with the voting and contended that the petition of the foremen should be considered as that of only unorganized employees, and that in view of their having less than 100 signatures they should not be privileged to bring their case before the Labor Board.

The Labor Board decided, however, that the railroad had complied with the established provision covering petitions of this nature and that in view of the fact that the vote was conducted with the approval and under the direction of the interested parties, it should be considered bona fide and the results considered final in so far as agreement negotiations concerned this class of employees. (Decision No. 412.)

Shall Supervisory Employees Be Allowed Overtime

In a case brought by the maintenance of way brotherhood against the Pennsylvania System, it was contended by the brotherhood that certain supervisory employees should be allowed overtime for all services performed after eight hours in making up payrolls, material reports, accident reports, etc. In passing upon this question the Labor Board applied the rule contained in Section 8 of Article 5 of the maintenance of way agreement which states that employees whose responsibilities or supervisory duties require service in excess of the working hours or days assigned for the general force will be compensated for on a monthly rate to cover all services rendered. It decided that in accordance with the above rule the employees in question were not entitled to overtime for the services mentioned. (Decision No. 411.)

Carpenters Refuse to Aid in Strike Duty

Three carpenters on the Pennsylvania refused to do work on bunk cars that were being prepared for use by railroad police during the outlaw switchmen's strike in April, 1920. As the carpenter gangs were all engaged on this work, there was nothing for these men to do, so they were laid off. In a case involving the pay of these carpenters for the time not employed during the strike, the Labor Board held that the men were not entitled to it. (Decision 517.)

Representation for Crossing Watchmen

On November 19, 1921 the United States Railway Labor Board issued a decision concerning the representations of the crossing watchmen employed by the Long Island Railroad. The railroad entered into a separate agreement of rules and working conditions for crossing watchmen with the Long Island Crossing Watchmen's Association. The representatives of the United Brotherhood of Maintenance of Way Employees' and Railway Shop Laborers protested against the method by which the carrier determined the wages of the employees in this regard and the decision of the board was that the Maintenance of Way Brotherhood is entitled to some voice in conducting a ballot in which the crossing watchmen designate their choice of organization. The board, therefore, ordered a new ballot of the crossing watchmen. (Decision No. 418.)

Five-Day Week Not Violation of Rules

On February 9, 1921, the Central Railroad of New Jersey found it necessary to make a further reduction in expenses and to avoid an excessive decrease in the force introduced the five-day week. Maintenance of way employees objected to this measure and quoted Section 1, Article V of the agreement, which reads, "Gangs will not be laid off for short periods when proper reductions of expenses can be accomplished by first laying off the junior men." The Labor Board decided that the railroad did not violate the meaning and intent of the section and that the employees were not entitled to claims for payment for the days lost. (Decision 519.)

Extra Men for Winter Work Not Section Laborers

During the winter of 1920-1921, extra gangs were employed by the Chicago & North Western for removing snow from the right-of-way, the men in some cases working with regular section men. These men were paid straight time for the ninth and tenth hours, but contended that because they were employed with section hands they were entitled to time and one-half. The railroad contended that it was within its rights to organize extra gangs for extra work at any time and that the men must be paid in accordance with rules governing the payment of extra gangs. The decision of the board sustained the contention of the railroad. (Decision 522.)

Seniority Rights for Less Than Six Months' Service

Three Italian track laborers on the Buffalo, Rochester & Pittsburgh were laid off in January, 1921, after less than six months' service on account of a reduction in force, and entered a complaint before the Labor Board because they were not allowed to displace other laborers junior to them in the service. The decision of the board is that while it favors close observance to the seniority rule, it does not construe the provision of this agreement as making it compulsory for the carrier to regard seniority of employees until they have been in service six months. The complaint was, therefore, denied. (Decision 523.)

Foremen Not Paid Extra for Work on Holidays

The United Brotherhood of Maintenance of Way Employees and Railway Shop Laborers presented a claim for compensation to section foremen on the Southern Pacific for work performed on holidays. Prior to federal control section foremen on this road were paid by the calendar month for service, including Sundays and holidays. The increase under Supplement No. 8 to General Order No. 27 made no change in the number of days constituting a month's work. Under the National Agreement, effective December 16, 1919, the section foremen were placed on a 313-day basis, allowing extra compensation for Sunday work. The carrier continued this plan, effective after March 1, 1920, but the brotherhood contended for a 306-day basis to allow for seven regular holidays. (Decision 546.)

Board Holds Foreman Not Inattentive

F. G. Davis, a section foreman on the San Antonio, Uvalde & Gulf at North Pleasanton, Tex., was dismissed from service on January 27, 1921, because he failed to cover up some oil as he had been instructed in a telegram. His defense was that he did not find the telegram until too late and that he had looked in his mail box for

it once previous to his actually finding it. The railroad contended that he had not exercised due diligence in looking for it and furthermore that he had also been guilty of other lapses in duty. Moreover, he had failed 2½ months before to discover broken angle bars. Officers of the railroad admitted that he would not have been discharged for failure to obtain the telegram alone, and they also stated that he had not been previously informed of the broken angle bar. The decision of the board was that the management of the railroad was not justified in relieving Mr. Davis and that he should be restored with seniority rights and paid for the time lost. (Decision 552.)

Section Foreman Dismissed

In a case against the Texas & Pacific, the Labor Board sustained the action of the railroad in dismissing R. Phillip, section foreman, because he had not maintained his section properly. (Decision 551.)

Section Foreman Reinstated

Peter J. Reilly, a section foreman on the Central Railroad of New Jersey at Aldene, N. J., was dismissed from service on April 2, 1920, as a matter of discipline. The Labor Board decided that the discipline administered was too severe and that he be reinstated to his former position with seniority rights unimpaired, but not paid for the time lost. (Decision 579.)

Extra Gang Men Refuse to Work for Straight Time

On July 12, 1921, 23 extra gang laborers on the Delaware, Lackawanna & Western were employed on a work train unloading ballast. During the absence of the work train the men were employed shoveling ballast out of the track, where it had been unloaded, and when regular quitting time came at 4 p. m., the assistant foreman asked the men to stay at work until the work train (which was late) should arrive to take them home. He told them that they would be paid straight time for this extra work. Previous to this they had been paid time and one-half for overtime, but in accordance with Addendum No. 2 to Decision No. 119, pro rata rates had been established, of which, however, the men were not aware. Consequently they refused to work and were dismissed. The Labor Board sustained the action of the carrier, but decided that the railroad must not discriminate against these men in case they apply for re-employment. (Decision 588.)

Track Watchmen Should Be Paid on a Monthly Basis

In the Lehigh and Susquehanna division of the Central Railroad of New Jersey 74 employees are classified as track watchmen and 6 are classified as tunnel watchmen. This division occupies a mountainous region with a great many deep cuts along streams and mountain sides where conditions are generally favorable for slides or other track defects which require close watching to insure safety of track. These men are paid on the monthly rate of $114.67 and allowed overtime for work outside of an eight-hour tour of duty. On the ground that track walkers on other divisions of the same railroad are paid on the hourly basis, these employees requested that they also be changed to an hour rate, but the railroad pointed out that their work was of an entirely different nature, which required them to be employed almost constantly inspecting work, and that under the provision of section (a-12), Article V of the agreement promulgated by the United States Railroad Administration, these men should be paid a monthly rate and that they are not track walkers in the ordinary sense of the term. The decision of the Labor Board sustained the position of the railroad. (Decision 589.)

Organizing for Winter Work in the Boston Terminals

By John Talbot
Track Supervisor, Boston & Maine, Boston, Mass.

THE BOSTON & Maine terminal at Boston, Mass., is the most important main artery of freight traffic which supplies New England with the vast quantities of food and fuel from the north and west.

The terminal consists of 200 miles of tracks, including five passenger yards, 24 freight yards, coal pockets, enginehouses, repair shops, etc., and one can readily see what a tremendous and difficult task faces the maintenance forces in the rigorous New England winter with a blanket of snow from December to March.

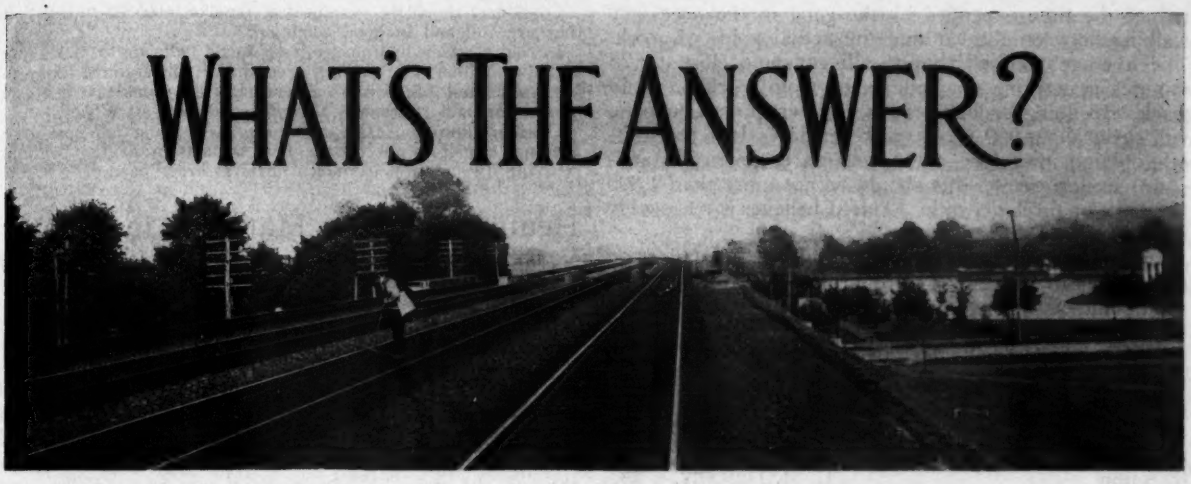
During the fall months when track work slackens, all men available are used to see that drainage systems are fully cleared and in the best possible condition. Usually, if conditions permit, drainage is provided where difficulty had been experienced during the previous winter. My assistant is given specific instructions to see that all sections are fully equipped with shovels, brooms, picks, hydro-carbon, etc., so as to be fully prepared for the most extreme winter conditions. The next task is to equip the forces with men thoroughly capable of handling gangs. This always seems to be the most difficult problem, but we have found much relief in the assistance given us by the engineering forces, who have proven a most valuable asset, especially when it was necessary to recruit outside gangs who have a faculty for trying to shirk their duties even when traffic is most pressing.

When we have the leaders of the gangs appointed, the problem becomes a matter of routine. The regular track foremen and section crews, who are thoroughly familiar with traffic conditions, are assigned to passenger and freight main lines. These men, who are accustomed, after years of long service, to the most rigid weather conditions, take care of the slips, switches, interlockers and tracks of the main lines. Several are assigned to take care of the slips and switches that have to be swept with brooms and the ice dug out with picks and shovels, as hydro-carbon cannot be used in some parts of the terminal, as it is built on timber. Another part of the crew is appointed to keep the tracks clear.

The extra men that are recruited from the outside are usually green men, and are put under the supervision of temporary foremen from the engineering department, who are fully qualified to handle men due to their constant contact with laborers in the construction of buildings and track work. These men and their crews are usually placed in freight and passenger yards, with instructions to keep in touch with the yardmaster, in order that they may assist him in digging out cars and in keeping freight and passenger movements as near normal as possible. Several men are assigned to take care of the switches so that they may move freely and easily, while the remainder of the crew clear the tracks, taking care that the drains are kept clear. At night, a work train crew is assigned to each section to load snow shoveled out of the tracks.

Not the least element of success in handling the snow and ice situation on this terminal, is the co-operation on the part of the bridge and building, mechanical and operating departments. During heavy storms, the first named takes full charge of removing snow from 12 long, uncovered platforms at North Union Station, and assists the mechanical department in keeping engine house turntables in operation. The operating department employs the freight handlers to work in conjunction with the maintenance of way men to keep the freight yards open.

WHAT'S THE ANSWER?



This department is an open forum for the discussion of practical problems of maintenance of way and structures. Readers are urged to send in any questions which arise in their work in the maintenance of tracks, bridges, buildings and water service. The *Railway Maintenance Engineer* also solicits the co-operation of its readers in answering any of the questions listed below.

The following questions will be answered in next month's issue:

(1) What is a simple method for determining the angle of a frog?

(2) Do the interests of convenience and safety require foremen to train their gangs to handle the motor or hand car in a certain way, and what is the best method?

(3) Where staging is used at various heights in repairing a trestle bridge is there any advantage in using iron staging hooks? If so, how are they attached to the bridge deck and how are they adjusted for height?

(4) Does Portland cement deteriorate in storage when protected from the weather?

(5) What are the relative advantages of raw and boiled linseed oil for painting?

(6) What is the steepest allowable pitch for a tar and gravel roof?

(7) What is an effective method of protecting water columns from freezing in a climate ranging from 30 deg. above zero to 40 below in winter?

(8) What is a practical design for a valve controlled clean out opening or drain in the base of a water tank that will not freeze in the winter?

The Proper Spacing of Section Car Set-Offs

First Answer

What is a reasonable distance between section car set-offs? Should they be placed on the inside or outside of curves?

A reasonable distance between section car set-offs is one-half mile, on both single and double track lines, the locations selected should be such that set-offs will be located near the center of curves on the inside. In each case set-offs should be constructed alternately on each side of the track. This will afford section men better protection in getting their car off for approaching trains. It will also afford the least possible walking when going out to work and quitting work. It is also very natural for section men to turn the car to the low side of the track rather than the high side when setting it off on a curve.

L. COFFEL,
Supervisor, Chicago & Eastern Illinois, Momence, Ill.

Second Answer

In the consideration of this matter the writer has come to two primary conclusions upon which his reasons for the proper spacing of set-offs are based. The first is that the principal purpose of the set-off is to reduce to a minimum the accumulation of unproductive time by providing a place close to the main track for a hand car when the section men are doing work. The second conclusion is that the road crossings should not be used for set-off purposes except to get into the clear of passing trains while the hand car is in transit.

The following reasons are given for not leaving a hand car at a road crossing while the men are at work. The hand car, when placed at the side of and near the roadway, may be a cause of damage to some vehicle which stands at or is approaching the railroad tracks, thus giving rise to claims against the railway for damage. This is known to have occurred. In a great many cases a pipe or culvert extends under the roadway, and the car may be run off the roadway into the ditch to give adequate clearance, thus interfering with the ditch; or if this practice is allowed to continue it will break down the culvert or stop it up, causing additional maintenance expense. A hand car left on or near a road crossing would, in most cases, have coats on it and almost always tools, both of which may be stolen by dishonest persons.

As a general rule, the frequency of road crossings is such as to provide ample opportunity for avoiding trains. Spacing the set-offs, however, as determined upon as best suited for the purpose of reducing unproductive time to a minimum will also serve the requirements of safety without making it necessary to use the roads. The question, therefore, resolves itself into a matter of determining the average number of feet of track that a main line section gang will work over in one day, and from this distance to determine the best spacing of set-offs in order to

reduce the time expended by the gang in the necessary walking between the car and the actual point of work. The average section laborer will consume close to 25 minutes in walking one mile to or from work on main track. In doing ordinary work an average section gang will cover about 900 ft. of track per day. It is the writer's opinion, therefore, that, from an economical standpoint, section car set-offs should be not more than 1,800 ft. apart, or three per mile. This, I believe, is reasonably far apart.

In building the set-offs they should be located upon the outside of curves. This is preferable from a safety standpoint, as a longer view can be obtained from the set-off in each direction along the track if there are obstructions such as the sides of cuts. In their location on the outside of a curve, they also do not obstruct drainage and thereby cause loose ties. The possibility of their shedding water toward the track can be taken care of adequately by giving them a slight grade in the opposite direction.

L. M. DENNEY,
Track Supervisor, C. C. C. & St. L., Indianapolis, Ind.

Non-Freezing Solutions for Water Barrels

How should brine be prepared for winter use in water barrels on bridges?

In an article appearing in the Railway Age of December 10, 1921, the following statement was made: "The water in the barrels can be kept from becoming stagnant or from freezing by dissolving from 100 lb. to 150 lb. of calcium chloride (common salt) in each barrel."

To this G. W. H. Thomas, New York City, made the following reply, which answers the question very thoroughly:

Calcium chloride and common salt are entirely different substances, the technical term for common salt being sodium chloride. I am making this statement, as common salt is no longer recommended for use in fire barrels because of not protecting the water from freezing at low temperatures and also due to the increased cost of its use in fire casks over that of calcium chloride. The table and notes herewith give information on the use of calcium chloride.

Calcium chloride will, as the article states, keep the water from becoming stagnant, will also protect water from freezing at lower temperatures, practically prevents loss from evaporation and requires no care once the calcium chloride has been put into solution.

FREEZING POINT OF CALCIUM CHLORIDE SOLUTIONS

Temp., Fahr.	Lbs. per gallon of water	Specific gravity *	Degrees, Baumé
+25°	1¼	1.07	10
+10°	2½	1.134	18
0°	3	1.178	23
—10°	3¾	1.206	26
—15°	4	1.216	27
—20°	4¼	1.226	28
—25°	4½	1.236	29
—30°	4¾	1.246	30
—40°	5	1.267	32
—50°	5½	1.277	33

The solution should be made of granulated 75 per cent calcium chloride, free from magnesium chloride, and should preferably be mixed in a vat before being placed in fire casks, care being taken to see that the calcium chloride is entirely dissolved by thorough stirring.

If wooden barrels are used, they must first be well coated inside with asphaltum, and all containers should be kept covered.

*The specific gravity of a substance is the number of times heavier the weight of a certain amount of the substance is than the same amount of water.

Containers should be examined at regular intervals to see that they are full and in good condition.

In cold weather, hydrometer tests should be made to make sure that the solution is of correct strength for temperatures likely to be encountered. Sufficient calcium chloride should be kept on hand in airtight receptacles to refill containers after use.

Calcium chloride is far superior to salt, being non-corrosive, does not evaporate nor become foul, remains in solution without constant stirring, and has much lower freezing point.

Heating Concrete Materials in Winter

How should concrete materials be heated in cold weather?

First Answer

Steam heat is usually available where a fair-sized concrete job is in progress and in such cases the sand and crushed rock can be heated most conveniently by piling it over a coil of steam pipes which are laid on the ground and perforated at intervals so the steam can escape through the mass. When steam cannot be used, the sand and rock may be heated by piling it over one or more sections of old cast iron culvert pipe in which a fire is kept burning.

While warm water may be an additional help, little attention need be paid to warming the water, provided the stone and sand are properly heated. Experiments have shown that water as high as 100 deg. F. may have a permanent injurious effect on concrete and foremen should be cautioned to avoid the use of boiling water, but to be sure that the sand and stone are thoroughly heated. Concrete made with such heated materials will retain the heat for a long time and if tightly covered over where work is not in progress, will withstand considerable frost without injury. As far as possible it is well to avoid placing concrete during freezing weather, but by using care first class work may be done, even though weather conditions are not favorable.

EDWIN M. GRIME,
Supervisor, Northern Pacific, Fargo, N. D.

Second Answer

This subject is one on which different men will have different opinions, and perhaps justly so, as conditions vary in different localities and on the various kinds of work. Also the means at hand, such as fuel equipment, etc., have quite a bearing. Then the location is another factor to be taken into consideration, as a method that could be employed at one place might not be safe or practicable at another. Then, again, the manner in which the concrete is protected from the cold after being poured must be taken into consideration, as on this depends to a great extent the success or failure of the job.

I would not recommend the use of the steam coil or jet for the average job, as sand, gravel or stone, heated in this manner collects a certain amount of moisture, especially where the steam jet is used. And if the material is not used as fast as heated you will have considerable trouble, as the aggregates will freeze very rapidly, thereby causing more steam to be used, and taking longer to rethaw them. Also the added amount of moisture goes with them into the mixer, and unless you have a very careful man handling the water you will have a mixture that is altogether too wet. Further, the fuel required to produce the heat by this method is usually coal, and consequently more expensive than the fuel ordinarily used for heating purposes by other methods.

The practice of piling refuse wood directly on top of the various aggregates and heating in this way is not good practice, as this takes an excessive amount of fuel to heat the aggregates to a depth sufficient to make for economical handling by the shovelers. Also that portion on top

is in danger of becoming too hot, which is very dangerous to good concrete.

In my opinion, the best and most economical method to date is to use a section of an old smoke stack, as it requires a minimum amount of fuel (any scrap wood may be used) and a better regulation of the heat can be obtained. While it is true that a second handling of the aggregates is necessary, they can be heated more nearly uniform, and at a temperature that is more commensurate with good concreting. Water may be heated by steam jets or coils where a steam mizer is used, but great care should be exercised not to get it too hot. Where a gas engine is used for power heat externally applied will be necessary. J. P. WOOD,

Supervisor Bridges and Buildings, Pere Marquette, Saginaw, Mich.

Sanding Paint Coatings

What is a good method for sanding paint coatings on stations and other railway buildings?

There is really only one effective method known to sand paint, and that is to apply the paint somewhat heavier than ordinarily used, and then blow clean sand into the wet paint. This can be done with a hand bellows with a funnel attachment or with compressed air.

In this connection, however, it may be worth while mentioning that of late years sanding has been abolished to a great extent. The original reason for sanding structures was the habit of loiterers to whittle or write on structures, and since this habit has abated to a great extent there is apparently no special need for the expense of sanding, as it produces a rough surface, to which dirt adheres more freely. CHARLES ETTINGER,

Supervisor Bridges and Buildings, Illinois Central.

Adjusting the Pump Stroke

All pump jacks for well pumps and all gear drive wheels on combination pumps provide for two or more adjustments in the stroke of the pump. What considerations determine which stroke to use?

First Answer

The capacity of a pump, the amount to be delivered and the depth of the plunger should govern the length of the stroke. When considering the capacity of a well, it is usually better to adjust the stroke so as to lower the water in the well sufficiently to permit a maximum flow from the water bearing strata supplying the well. When operating a single acting deep well pump, it is usually better to operate with a short stroke, thus eliminating to a certain extent, excessive strain on the head and the tendency of the rods to buckle, due to the long fall of the downward stroke when the pump is provided with a long stroke adjustment. L. E. ELLIOTT.

Water Engineer, St. Louis-San Francisco, Springfield, Mo.

Second Answer

Pumps of this class are usually driven by electric motors or by gas or oil engines which have practically constant speed. Therefore, in order to give the pumps some degree of flexibility in capacity, it is necessary to provide for an adjustable stroke. The first consideration that governs is, of course, the quantity of water desired in a unit of time. The capacity of the well is often a limiting factor also. For instance, a pump head operating a 4-in. working barrel at a constant rate of 30 strokes per minute will pump 979.2 gal. per hour with a 10-in. stroke, 1370.8 gal. per hour with a 14-in. stroke and 1562.2 gal. per hour with an 18-in. stroke. Usually a pump will give longer service if operated at slow speed and a long stroke, but if the installation is put in on this basis and it is later found necessary to increase the capacity of the pump it will then be necessary to change pulleys or gears to increase the amount of water handled, while if the installation is made using the maximum speed and shortest stroke, the capacity can easily be increased by lengthening the stroke.

J. H. DAVIDSON,

Water Engineer, Missouri, Kansas & Texas, Dallas, Tex.

Third Answer

Provision for varying the stroke on pump jacks and gear drive wheels on combination pumps were quite common up to within the past few years, although the more modern pumps are not generally equipped with provisions for variable stroke. The original reason for providing these power heads and pump jacks with means of adjusting the stroke lay in the fact that they were not always designed to fit a special pumping condition and the varying stroke was to permit their meeting the various pumping conditions found in water service work. The considerations determining which stroke to use are the power available in the prime mover, the quantity of water required, the head against which the water is pumped, the size and length of the pipe line and the amount of water available. There is but little flexibility in a belt or gear driven pump head or jack, as it is usually operated at a constant rate of speed. Therefore, to meet the variations in head, delivery, requirement and supply, it is necessary to make provisions for changing the stroke of pump where actual operating conditions are not fully known or subject to variation. C. R. KNOWLES,

Superintendent Water Service, Illinois Central, Chicago.

Cleaning Clogged Sewers

What equipment and methods are most advantageous for the cleaning of sanitary or storm sewers or treating plant sludge lines that have become partially filled with sediment?

First Answer

For the cleaning of sewers or treating plant sludge lines the equipment usually required consists of the following items: A set of hickory rods equipped with Felton's sewer rod couplings, a double purchase winch having a barrel of large diameter, a length of ⅜-in. pliable steel wire cable twice as long as the length of the section pipe to be cleaned at each set-up, plus enough extra to work over the barrel of the winch, a set of steel flue cleaners of varying sizes or adjustable from 6 in. to 10 in. diameter, also several stiff wire brushes 10 in. to 12 in. in diameter and two 8-in. steel tackle blocks.

Assuming that entrance can be had to the pipe line at two manholes or other openings about 30 ft. apart, the sewer rods are first shoved through the pipe and the cable dragged after them. After the largest cleaner with which it is considered practicable to start has been attached near one end of the cable, the other end is wound several turns around the winch barrel and then both ends of the cable are connected to make a continuous line. The winch is located at the opposite end of the line from where the cleaners are started and one or two men, as needed, then start winding the cable so as to pull the cleaners through the pipe line. As a most important aid in this method of cleaning, water under pressure should follow behind the cleaner. The cleaner retards the flow of water sufficiently so that the velocity is greatly increased where the water

escapes along the side of the cleaner and as fast as the cleaner loosens up the hard or stiff material the water clears it away. After one cleaner has been dragged through the operation is repeated, using the next larger size of cleaner, and finally the work is completed when the brushes are drawn through. This usually makes the line as clean as when first installed.

In the cleaning of sewers there is usually an opportunity for the surplus cleaning water to escape, but in the cleaning of other pipe lines, in addition to the equipment above mentioned, a small steam-operated centrifugal pump is usually required in order to dispose of the surplus water. This method has been used very successfully not only in cleaning sewers, but also in cleaning long lines of iron pipe which had become badly encrusted with lime. EDWIN M. GRIME,

Supervisor, Northern Pacific, Fargo, N. D.

Second Answer

The following methods for handling clean-out work were given at an experience meeting of drainage engineers at the last annual convention of the Iowa Engineering Society. All the methods appear to be applicable to railway problems:

Mr. Lamb: I found an 18-in. tile full of sand. No one knew how it got there, but we had to clean it out. We started at the lower end, opening the drain every 50 ft. We joined lath together so as to push a rope through this section, then tried to clean it by dragging chains through. A neighboring engineer suggested making a bucket of a disk of sheet iron and attaching it to a rod about 4 ft. long, with ropes to pull it back and forth. This worked very satisfactorily, and future work of this kind can be done at a much less cost than this first job.

Mr. Hoffman: I had charge of cleaning about 1,300 ft. of 15-in. drain that was three-fourths full of silt. We opened the drain every 125 ft. and got a rope through by means of battons bolted together. We cut two disks, 8 in. and 12 in. in diameter, from 2-in. plank, and mounted them on iron rods to which ropes were attached. By using a team the small disk was pulled back and forth and then the larger one used. This method was quite successful in this instance.

Mr. Gross: I had some experience with an 18-in. tile that was about two-thirds full of sand. We made a sack about 17 in. in diameter and filled it with hay. When weather conditions indicated the probability of a heavy rain we placed the sack in the drain. The rain came as per schedule; we never saw the sack again, but the drain was cleaned.

Storm Windows in Station Buildings

Is the use of storm windows practical and economical on railway stations?

The practicability and economy in the use of storm windows on railroad stations is a question. If station agents could be held responsible for putting on the windows, removing and storing them properly and without damage and if sufficient attention was paid to the amount of coal used in station heaters, I have no doubt that there would be a saving in the use of storm windows. If, however, the putting on, taking off and storing of these windows devolved upon the maintenance of way department, necessitating trips to stations, those in charge of heaters would have to be a great deal more careful than they are at the present time in the use of coal in order to show any saving.

We have found on this railroad that where portions of stations have been shut up to conserve fuel, very little saving was effected on account of the fact that the size of the heater required a large fire and also that there was not as much attention given to the fire in the heater and the temperature in station as might be. I think that the same condition would exist where stations were equipped with double windows. Only a thorough system of education and co-operation would make the use of storm windows economical. A. I. GAUTIER,

Supervisor of Bridges and Buildings, Boston & Maine, Concord, N. H.

Self Protection During Snow Storms

How should a track man safeguard himself when on sweeper duty in a snow storm?

First Answer

In daytime the track man should keep a constant lookout in both directions and do his work from outside of the track as much as possible. At night time he should keep a close lookout for headlights and other lights on approaching trains and cars and listen frequently. The solitary snow sweeper's life depends upon his constant vigil in night or day during a snow storm.

L. COFFEL,

Supervisor, Chicago & Eastern Illinois, Momence, Ill.

Second Answer

The sweeper should face the current of traffic and also face his lantern (when using the hooded type) to the current of traffic. In this connection it is to be remembered that the largest percentage of our railways are equipped with automatic electric signals. This gives each main line switch an indication of the approaching train. Thus by the sweeper facing the current of traffic and holding his lantern properly he is also facing the indication and by glancing frequently at the indication he will have ample time to safeguard himself.

In my estimation the indicator is the best safeguard a sweeper can find during a storm when he can neither trust to his sight nor hearing. GEORGE L. GLOVER,

Road-train Foreman, Michigan Central, Galien, Mich.

Third Answer

To a certain degree a trackman on sweeper duty can be safeguarded by his foreman, and at interlocking towers and yards by towermen and yardmen, respectively. But the real duty is up to the man himself.

The foreman, in selecting a man, should take into consideration the traffic conditions at the points to which he is assigning him and the man's familiarity with the traffic conditions at those points. This holds true especially at night. Whenever possible the night duties should be given to the most experienced men. At interlocking towers when trains are to be crossed over it is the usual custom for the towerman to inform the man cleaning the switches of the fact so that he will have the switches to be used in working condition. This fact serves to warn and protect the trackman.

The trackman himself should carry standard time and know the schedule time that all regular trains are due at points at which he is working. Furthermore, he should watch the trains to see if they carry signals indicating other sections of the same train. When he is working in the vicinity of an operator he should keep in touch with him and get a line on all trains and if they are on time or if late, the degree to which they are behind time. If the work is in the yard the man should observe the movements of the yard engines and not resume his work until he has satisfied himself that he knows where the engine is going. A man, to do efficient work of this

nature in a yard, should be one who has worked around yards enough to know the general movements of the yard engines.

When working at outlying switches he should watch the block signals carefully, if on a road having them, and wherever possible and consistent with his work, face against the direction of traffic. In all cases a man should keep on the outside of the track whenever possible. At night when it is storming badly men should be worked in pairs when at all consistent.

GEORGE F. DONAHUE,
Assistant Supervisor, New York Central, Rochester, N. Y.

Driving Expansion

Another answer to a question covered in last month's issue.

For driving rail I use a 30-ft. rail as a ram, but find it of advantage to support it from a tripod made of 2 in. by 4 in. spruce with a height of 7 ft. and bolted at the top, so that it can be folded and placed on a push car. I suspend the rail from this tripod by means of a chain with a hook at the lower end. This chain is attached at the center of the rail so that it will balance. After loosening the joint I have one man stationed at the end of the rail which comes in contact with the angle bar and two men at the far end. The ram rail is placed on its side so that the ball will bear against the web of the track rail. Then by swinging the ram rail back and forth, it is easily driven against the end of the angle bar. By using the tripod the men are not required to lift the rail and three men can easily drive the track 10 rail lengths at a time very quickly. By this method it is not necessary to open the track to raise one rail higher than the other so as to bring the ram against the end of the rail.

J. J. BETHUNE,
Roadmaster, Canadian National, Charlottetown, Prince Edward Island.

Softening Water on the Santa Maria

BY K. B. HOLEMAN
Superintendent, Santa Maria Valley Railroad, Santa Maria, Cal.

BAD WATER is a great bugaboo on many steam lines at the present time. Not only does it cause trouble in the boiler but in many cases pipes and fittings disintegrate very rapidly. The high prices of material the past few years have brought this expense out in glaring figures—especially on some of the smaller roads, with their smaller revenues.

A Set of Flues Would Not Last Over Six Months

Two years ago this condition existed on the Santa Maria Valley railroad. At that time a set of flues would last from four to six months upon the exercise of care in their use. Water from three wells was being used. Experiments were conducted by using water from one well only and it was found that the engines did much better than where the waters were mixed. The next problem was to develop the same kind of water at the different watering places in order that there would be no foaming or priming in the boilers. Scale matter had been forming very rapidly and it was not uncommon to find the lower portion of the boiler one mass of scale after a four months' run. Sometimes this would run up to the tenth or fifteenth row of flues.

Several chemical analyses were made of the different waters to determine just what the scale forming matter was and what chemical reagent would be necessary to cause precipitation before the water was used. It was determined that calcium sulphate was present in all of the waters to the amount of about 28 gr. per gal., magnesium carbonate about 9 gr. per gal., and magnesium sulphate in about 4 gr. per gal. These chemicals, coupled with the carbon dioxide, sulphur trioxide, chlorine and sodium oxide, made a very hard water to handle economically, that is, so that the cost of treatment in time would not equal the cost of repairs to the boilers.

The Installation of a Treating Plant Offered the Only Solution

Compounds were suggested as a means of treating the water, but after a fair trial it was determined beyond question of a doubt that the troublesome matter must be taken out of the water before the water entered the boiler, otherwise there was a likelihood of mud burns or other similar trouble. There was then only one course left to pursue and that was to install treating plants. Water treating plants cost hundreds of dollars and at the time it was necessary to devise a means of treating the water without adding any additional expense on the company.

Some steel tanks were obtained very cheaply from some old road working plants. These were steamed out and set up at the water plant. An old dismantled plant yielded a water pump which, while twice as large as needed, was capable of doing the work, and was obtained for its scrap value. The tank was piped to the fresh water and the pump connected up so that it would pump water from the treating tank into the main storage reservoir. The plant was then ready for business. In the meantime experiments were being conducted to determine the best formula to be used and a start was made by using caustic soda and soda ash. Later, however, the use of caustic was dropped and dehydrated lime substituted, the lime being obtained in air tight barrels and added to the water unslacked. The entire cost of the first unit, including the analytic work, the cost of the compounds tried and other chemicals was less than $500, or a very small part of the cost of a new set of flues.

The Results Have Been Very Satisfactory

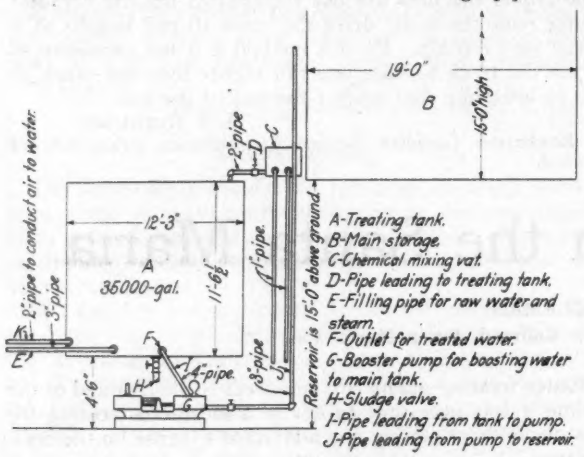
While the plant throughout was made principally from scrap material and for that reason shows much irregularity in the size of piping, etc., the results have been, after a year's try-out, very satisfactory. Boiler work has been greatly reduced. One or two days' work per month now suffice to keep the boilers up in first class shape, where formerly a boilermaker and his helper were working 10 to 12 hours every day and then could not keep them dry.

The largest saving, however, has been in fuel. After using water in the boilers that had all been treated alike the old scale began to come down very rapidly and after this was cleaned out and the water could get to the metal, the consumption of fuel dropped off. Last year when the boilers were scaled up an engine working a full day used an average of about 40 barrels of oil; the same engine doing the same work this year does it on 20 to 24 barrels of oil per day. There has also been a big saving in the cost of the brick work, for brick will now last from one inspection time to the next with-

out trouble, where before, with the constant leaks in the boilers, brick work frequently had to be renewed between periods.

The Process of Treating

The process of treating this water is as follows: Water is put in the treating tank hot, through Pipe "E," shown in the diagram, and at the same time the lime and soda ash are mixed hot in the small vat "C," located on top of the water treater. The valve in the outlet pipe of this vat, "D," is opened just enough to allow the solution to trickle into the water as it comes in through pipe "E,"



A Diagram of Softening Arrangement

the effect of which is to mix the solution thoroughly with the water. The solution is made up of 6 pounds of lime and 10 pounds of soda ash, heated to the boiling point, experience having shown that better results are obtained from the soda ash when heated than when put in cold.

The capacity of Tank "A" is about 35,000 gal. After this tank is filled a current of air is forced through Pipe "K," and the water thoroughly agitated, after which the mixture is allowed to settle until thoroughly clear, or about two hours, after which the water is pumped through pump "G" and the outlet pipe "J" to the main storage tank "B."

The supply of water is secured from the city water mains, and the pump "G" is cut in both ways, so in case it is not desired to take water through pipe "E," it can be pumped directly into the tank in a very few minutes.

Heavy Snow Ties Up Rail Traffic Into Washington

THE operation of trains in and out of Washington, D. C., was subjected to severe delays and interruptions at the close of the past month by an unusually severe snowstorm which caused a fall of snow estimated at as much as three feet. This storm started on Friday, January 27, and lasted practically 48 hours. The severity of the storm seemed to be centered at Washington, the snowfall extending only a few miles north of Baltimore and but a short distance west.

The territory affected is one in which storms of this kind are exceedingly rare. Consequently, the railroads were not prepared to cope with this to the same degree of effectiveness as would be the case in territories frequently subjected to storms of this kind. Therefore, it was not many hours after the storm was at its height before the forces in the large passenger terminal at Washington were unable to keep tracks open. The first trains to be affected were those entering the station at about 10 p. m. on January 27. During the night the situation grew much worse, so that on the following day the Pennsylvania Railroad operated only 21 trains into the station and 10 trains out, instead of 43 trains scheduled in each direction. About 6 a. m. on Sunday, January 29, the snow stopped falling, and with a slowly rising temperature the conditions gradually improved and train service restored approximately to normal by the evening of that day.

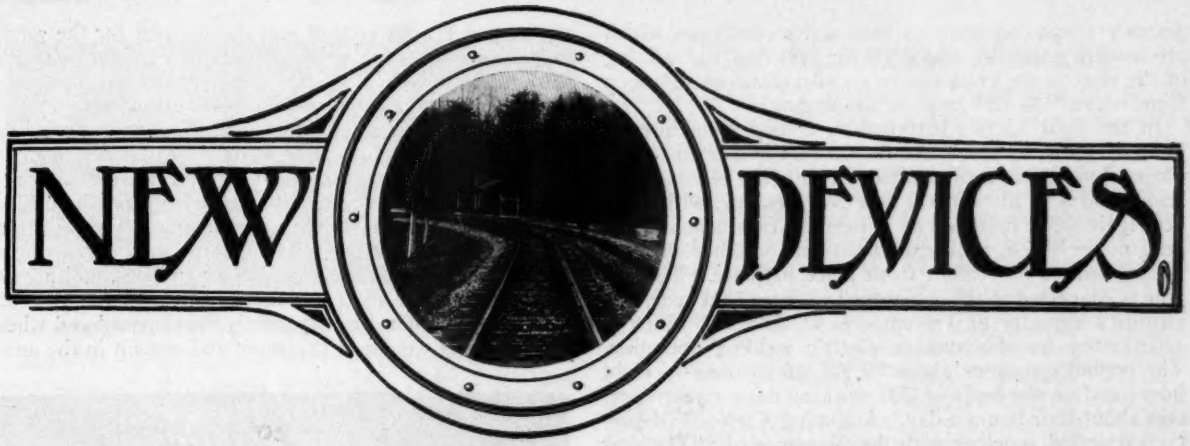
During the course of the storm the energies of the maintenance of way forces were directed to keeping tracks open through switches and interlocking plants as well as this could be done with the means at their disposal. The burden on the terminal company was reduced as much as possible by making up trains scheduled to pass through Washington from the north so as to require a minimum of switching of sleeping cars and other equipment at Washington. One difficulty experienced by the track forces was a shortage of snow melting oil. Call was made on the Pennsylvania for from 15 to 20 barrels of this material early on Saturday, the 28th, and after a canvass of the various terminals on the system, 15 barrels of the oil were located at Harrisburg. Instructions were then issued to load this on a car and attach to the rear of the first passenger train, which was detained for 51 minutes for this purpose.

New Use for a Concrete Mixer

It is the frequent experience of maintenance men when searching about for a method of handling or performing a work for which equipment has not been especially provided to discover that tools or equipment which have been developed, carried in stock and regularly used for a certain purpose, are quite capable of doing other work. One of the more recent evidences of this presents itself in the incident which occurred on the Chicago & North Western at Hurley, Wis., when a concrete mixer was used very effectively in mixing the ingredients for some cold-mix asphalt for installation in a road crossing.

This work consisted of applying a strip of paving about 60 ft. wide and 70 ft. long, to a track crossing at Hurley, Wis., in which the Barrett Company's "K P" Tarvia mixture was used. All ingredients of the crossing pavement were mixed with the Koehring Machine Company's Dandie gasoline mixer, No. 110, and the results were very satisfactory. The success of the method, according to G. Darrow, roadmaster on the Chicago & North Western, is dependent upon the following conditions: "The stone must be thoroughly dry and not too cold, the sand must be dry and of a medium temperature and the Tarvia must be only of such a temperature that it will remain fluid." Unless such conditions are secured the desired adhesion cannot be obtained from the Tarvia. The mixture such as was used on this particular work must be mixed the same as concrete ingredients and while they have been so mixed by hand, it was found that the mixer does much better work under favorable conditions.

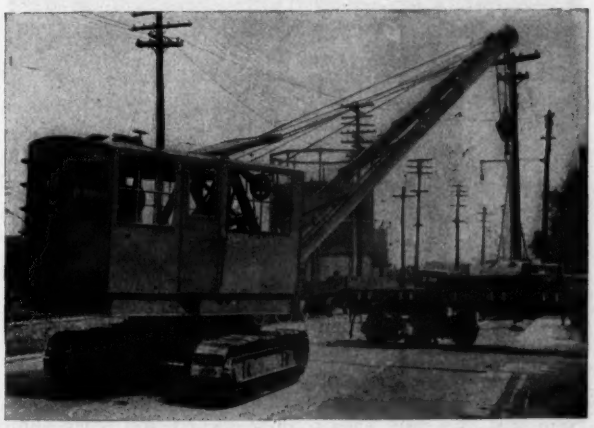
THE TREND OF FREIGHT TRAFFIC.—The Bureau of Statistics of the Interstate Commerce Commission has prepared a chart showing the trend of railway freight traffic since 1890, which indicates that, based on the rate of growth prior to the war period, and disregarding the great increase during the war period, which was lost in 1921, it would take until 1929 to reach the high level that was reached in 1920. The 1921 ton mileage is estimated at 313,300,000,000, which is the lowest since 1915.



A New Crawling Tractor Crane

AMONG recent developments in power equipment of interest to railway men is a new crane developed by the Industrial Works, Bay City, Mich. Consistent with a tendency quite general among manufacturers of such equipment, this machine is of the continuous tread type, as a result of which the crane is adapted to the handling of materials independently of tracks, as in storage yards, tie treating and reclamation plants, etc., where it affords a most convenient and economical means of handling rail, lumber, coal, gravel and similar materials.

For this and similar applications this machine is designed so that it may be equipped to operate hook and blocks, grab bucket, ash scraper bucket, wood grapple, electric lifting magnets, shovel dippers, or pile driver



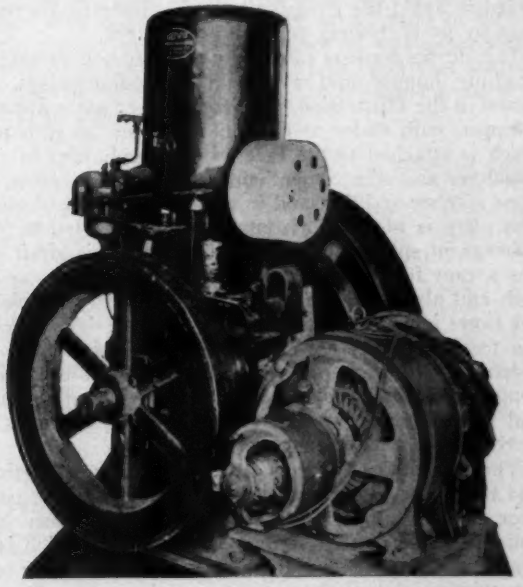
Using the Crane to Load Cars

leads with a drop hammer. Also the continuous tread system of locomotion is arranged so that the movement of the tractor may be controlled independently of the operation. The steering mechanism itself is controlled by friction clutches and brakes in such a manner that one or the other belt may be disconnected from the motor and allowed to coast or to be held stationary by the brakes during the movement of the crane over the ground, an arrangement which permits of turning the machine sharply or through a wide angle as the operator sees fit.

The power for operating and moving the machine is furnished by an internal combustion engine, an element of the design which is said to be of advantage in the field of service for which the equipment is intended for the reason that the machine is at all times ready for immediate use and affords a means of dispensing with the employment of a licensed engineer. The crane is equipped with a 30-ft. boom made of two channels latticed with angles and tie plates and is capable of lifting 20,000 lb. at a 12-ft. radius. Up to the capacity of the motor, any combination of slewing and hoisting is capable of being made.

A Gasoline Driven Engine Electric Welding Outfit

WHILE welding by the electrical process possesses features which make it very desirable in many classes of work, particlarly those where the heating of the metal must be confined to a small area, as in the case sealing cracks, calking edges, etc., in order to eliminate the trouble which would otherwise arise from contraction of the metal following heating, there are many situations in which this process may not be used unless the apparatus is such as to permit of its being transferred readily from one place to another, and to function independently of its distance from power lines or the amount of power available from these lines.



A Portable Gas Engine Electric Welding Unit

This requirement has presented an obstacle somewhat difficult to overcome, however, for the reason that while gas engine power offers the logical solution of the problem, the generation of electricity for welding work re-

quires unusual constancy of feed under conditions which are usually severe by reason of the fact that the striking of the electric arc gives rise to an instantaneous variation from no-load to full load on the engine.

In the light of this information considerable interest attaches itself to the outfit shown in the accompanying illustration. This equipment consists of an electric generator and a 10 hp. vertical type Novo engine, with magneto ignition, so mounted as to permit of its being placed on a motor truck, push car, outfit car, or other carriage for immediate movement from place to place. The engine is connected to the generator by means of a gear, and affords a capacity of 150-amperes at 20 volts, which is satisfactory for the average electric welding operation. The engine consumes about 10 gal. of gasoline in eight hours and on the basis of 200 working days a year operates about four hours a day. Assuming a ten-year depreciation period, together with the allowance of $100 a year for maintenance and repairs, and including the cost of gasoline and oil, the outfit costs about 69 cents an hour to run. The engine is a product of the Novo Engine Company, Lansing, Mich.

A New Aggregate Proportioner

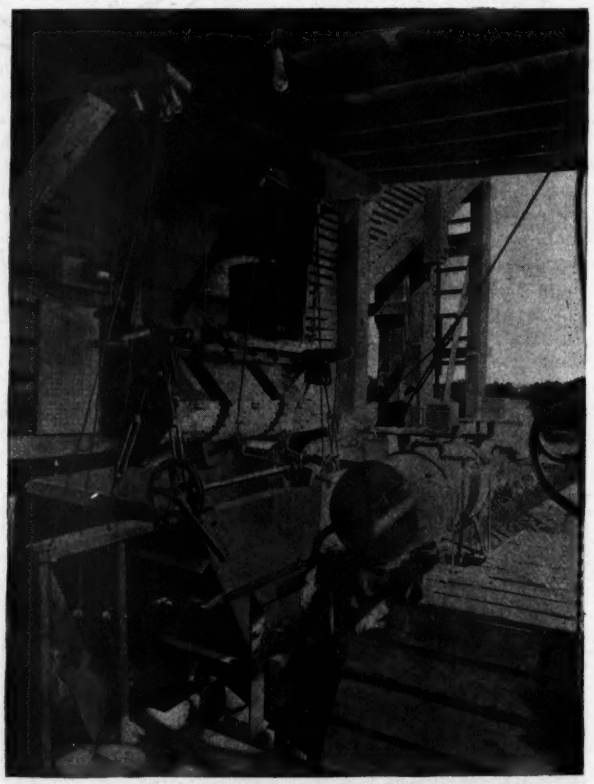
IT IS well recognized by students of concrete construction that a high degree of uniformity in mixing is essential to reliable work. The usual method of proportioning the aggregate has been to measure sand, gravel and cement by volume. While this system is generally convenient, it permits considerable variation to occur in the mix due to the difference in the density of the materials when large quantities of fine aggregate are handled. In view of this, it is interesting to note the recent development of a device which, while affording the convenience of the volumetric system of measuring, is designed to avoid the irregularities of volumetric measurement by proportioning according to weight.

This device consists essentially of three hopper gates, a weighing hopper and a system of counterpoises. As shown in the illustration, the three hopper gates are each equipped with slides and are mounted on an iron plate which is attached to the face of the supply bins in such a manner that the cement enters one of the gates, the stone another and the sand in the third. Mounted on the iron plate is also a horizontal shaft, supported in ball-bearings in split brackets at each end. This shaft carries a cam for closing each of the hopper gates and at each end also carries a bell crank, one arm of which is five times longer than the other to give the desired leverage to the counter-poise system. Suspended from the shorter arm of each of these bell cranks is the weighing hopper into which the aggregate is dumped and measured and from which it passes, as the illustration shows, directly to the concrete mixer.

The longer arm of each bell crank extends vertically and the two arms are connected by a cord which passes over pulleys supported on an overhead channel beam and thence down to a second channel beam which is arranged to carry the load of the counterpoises. The counterpoises consist of three pans, one above the other and all centered on a shaft, up and down which each pan may slide. The top of the shaft is secured in that channel beam which also carries the upper pulleys for the bell crank cord, and is itself supported on brackets extending out from the face of the wall. The lower end of the shaft is secured in that beam which is suspended on the bell cord connecting the cranks.

Each pan is sufficient in size to take care of the counter weighting for weighing the aggregate, the bottom pan serving as the counterweight for the stone aggregate, the middle pan for the cement and the top pan for the sand, and, according to the leverage, each pan weighs one-fifth of the actual weight of the aggregate to be measured. With the upper and the middle pans resting upon brackets and with cords extending from each hopper gate over pulleys and thence to a point from which all of the gates may be opened, the system of operation is as follows:

To measure a batch, the stone gate is opened by means of the cord. As the weight of the stone in the weighing hopper balances the weight of the bottom counterpoise pan, and moves the bell crank, the pan rises, and a cam on the horizontal shaft automatically closes the gate on the stone bin. The cement gate is then opened and when the combined weight of the stone and cement in the auxiliary hopper balances the weight of the two lower pans, these pans rise and a second cam closes the cement gate. Similarly, the sand gate is then opened and when sufficient sand is emptied into the auxiliary hopper to give the hopper, already carrying the stone and cement, sufficient weight to raise all three counterpoise pans, a third cam on the horizontal shaft automatically closes the sand hopper and the batch is then ready for dumping into the mixer. As the material leaves the auxiliary hopper, the pans drop automatically to their original positions and the proportioner is ready for another batch.



An Installation of the Proportioner

By means of this proportioner it is claimed that materials may be measured so that the error per yard batch will rarely exceed 50 lbs. The device is being manufactured by the Lakewood Engineering Company, Cleveland, Ohio, under the patent of Nathan P. Johnson of the firm of Hool & Johnson, New York City.

CHILEAN RAILWAYS.—The total railway mileage of Chile is 5,200 miles, of which about 30 per cent is privately owned, mainly for mining and industrial purposes.

American Railway Engineering Association

Bulletins containing committee reports for the coming convention are now being distributed. Three bulletins, No. 239, No. 240 and No. 241, containing reports of 11 of the regular committees, have been sent to the members. The fourth bulletin, No. 242, will be ready for distribution within a few days. This will contain the reports of the committees on records and accounts; water service; signs, fences and crossings; and uniform general contract forms. It is anticipated that bulletins containing the remaining reports will be issued before the end of February. Committee chairmen are now engaged in preparing their reports on the personnel of committees for the consideration of the Board of Direction.

Bridge and Building Association

Unusual interest is being taken by the committees of the Bridge and Building Association, almost a 100 per cent response having been received from the men selected. All of the committees are at work on their reports and at least three of them are already 30 per cent complete. Among the factors contributing to this progress, which is considerably in advance of that of former years, are the publicity given to each committee's work and the cooperation on the part of members in forwarding information likely to be of value to them in preparing their reports. An eight-page bulletin covering the proceedings of the last convention has been issued and a second bulletin will be in the mails by February 10.

Roadmasters' Association

The officers are launching an extensive drive for members, with the expectation that a large number will be enrolled before the next convention, which will be held in Cleveland in September. Reports received from the various committees indicate that they are actively at work upon their reports.

Maintenance of Way Club of Chicago

The next meeting of the Maintenance of Way Club of Chicago will be held at the Auditorium Hotel, Chicago, at 6 p. m., February 15. E. D. Swift, engineer maintenance of way of the Belt Railway of Chicago, will present a paper on the maintenance of railway crossings to be followed by a general discussion.

Metropolitan Track Supervisors' Club

The last meeting of the Metropolitan Track Supervisors' Club was held in New York on January 14, with an attendance of 24. W. H. Armstrong, manager tie tamping department, Ingersoll-Rand Company, New York, gave a talk on the use of the pneumatic tie tamper, which was followed by a general discussion. There was also an informal discussion on the maintenance of motor cars. A number of speakers advocated the employment of a division maintainer to look after the cars. The next meeting of the club will be held on April 15, beginning at 1 p. m., when the subject for discussion will be the use of track jacks.

The Material Market

THE MARKET for iron and steel products is still very quiet, although this has not been reflected in any further reductions in price of any importance. The prices for track materials seem to be holding well and there has been little change as regards structural steel. A number of large contracts have been awarded recently, including one to the American Bridge Company for 17,000 tons to be used in the Chicago Union Station head house. In the case of wire and wire products, there have been some reductions, as indicated in the table below:

	Prices in Cents Per Pound			
	December 15		January 20	
	Pittsburgh	Chicago	Pittsburgh	Chicago
Track spikes	2.25	2.38 to 2.63	2.15 to 2.20	2.53 to 2.63
Track bolts	3.25	3.38 to 3.63	3.00 to 3.25	3.58 to 3.63
Angle bars	2.40	2.40	2.40	2.40
Tie plates, steel	2.00	1.90 to 2.00	2.00	1.88 to 2.00
Tie plates, iron		1.90 to 2.00		1.88 to 2.00
Plain wire	2.50	2.88	2.25	2.63
Wire nails	2.75	3.13	2.50	2.88
Barbed wire, gal	3.40	3.78	3.15	3.53
C. I. pipe, 6 in. or larger, per ton		$44.10		$44.10
Plates	1.50 to 1.60	1.60 to 1.75	1.40 to 1.50	1.60 to 1.75
Shapes	1.50 to 1.60	1.60 to 1.75	1.50 to 1.60	1.50 to 1.75
Bars	1.50	1.60 to 1.75	1.50 to 1.60	1.60 to 1.70

The scrap market is practically on the same basis as it was last month.

	Prices Per Gross Ton at Chicago	
	December 15	January 20
Relaying rails	$23.00 to $27.50	$23.00 to $27.50
Rerolling rails	12.50 to 13.00	12.00 to 12.50
Rails less than 3 ft. long	12.50 to 13.00	12.50 to 13.00
Frogs and switches cut apart	11.00 to 11.50	11.50 to 12.00
	Per Net Ton	
No. 1 railroad wrought	10.50 to 11.00	10.50 to 11.00
Steel angle bars	11.00 to 11.50	10.50 to 11.00

In the market for southern pine, which showed an advance in December over the quotations for November, there has been a reduction, so that in most items the prices are now where they were in November or even somewhat lower. On the west coast, on the other hand, there has been a general marking up of items of interest to the engineering and maintenance of way departments. This is probably accounted for by the fact that business has been holding up very well, the present output being well up to what it was in October.

Southern Mill Prices

	December	January
Flooring, 1x4, B. and B. flat	$48.10	$44.50
Boards, 1x8, 14 and 16, No. 1	25.45	26.45
Dimension, 2x4, 16, No. 1	24.35	22.60
Dimension, 2x10, 16, No. 1, common	24.75	22.90
Timbers, 4x4 to 8x8, No. 1	22.60	20.15
Timbers, 3x12 to 12x12, No. 1	25.25	25.55

Douglas Fir Mill Prices

Flooring, 1x4, No. 2, clear, flat	28.00	30.00
Boards, 1x6, 6 to 20, No. 1, common	10.50	11.00
Dimension, 2x4, 16, No. 1, common	11.50	13.50
Dimension, 2x10, 16, No. 1, common	11.50	13.50
Timbers, 6x6 to 8x8, No. 1, common	14.00	15.00
Timbers, 10x10 to 12x12, rough	14.00	15.00

Following are current crossties prices:

White Oak Crossties
(Hewn or Sawed)

	Chicago	St. Louis
No. 5—7x9—8 ft.	$1.35	$1.35
No. 4—7x8—8 ft.	1.45	1.25
No. 3—6x8—8 ft.	1.35	1.15
No. 2—6x7—8 ft.	1.25	1.05
No. 1—6x6—8 ft.	1.15	0.95

Heart Pine Crossties
(Hewn or Sawed)

No. 5—7x9—8 ft.		1.30
No. 4—7x8—8 ft.		1.20
No. 3—6x8—8 ft.		1.10
No. 2—6x7—8 ft.		1.00
No. 1—6x6—8 ft.		0.90

Early in the month a new table of Portland cement prices was issued, but this indicated only very slight modifications from the previous quotations. The following are prices per barrel in carload lots, not including package:

Pittsburgh	$2.03	Milwaukee	$2.18
Detroit	2.17	Minneapolis	2.24
Chicago	1.97	Davenport	2.22
Duluth	1.95	Cincinnati	2.35

General News

The Northern Pacific will move its western headquarters from Tacoma, Wash., to Seattle, as soon as the additional office space required is provided for, this office space to be obtained in two additional stories which the Central Building Company will add to its office building in Seattle.

In a head on collision which occurred January 31, on the Baltimore & Ohio, when a passenger and freight train met near Noble, Ill., resulting in the death of the engineer and fireman of the passenger train and the injury of three passengers, it is supposed that the passenger engineer was either dead or asleep, the accident having occurred on tangent track with both engines equipped with electric headlights, and the passenger conductor having received a short time before, the proper response to his meeting point signal.

The number of freight cars loaded with revenue freight during the year 1921 was 39,037,817 as compared with 45,118,863 in 1920, 42,180,328 in 1919, and 44,755,041 in 1918, according to compilations made by the Car Service Division of the American Railway Association. The 1921 figures represent a decrease of 15.7 per cent as compared with 1920, or 7.4 per cent as compared with 1919, and 12.8 per cent as compared with 1918.

A statement issued by the Treasury Department in January concerning the progress being made by railroads in reducing their debts to the government shows that while a total of $270,740,217 has been loaned to 72 companies from the revolving fund of $300,000,000, created under authority of the Transportation Act on certificates issued by the Interstate Commerce Commission, 17 of the railroads have already made repayments amounting to $32,423,360.

One of the few large grade separation projects now under way in this country is being carried to completion at Cleveland, Ohio, by the New York, Chicago & St. Louis. This is a depression project involving 800,000 cu. yd. of excavation on a relatively flat gradient and involves a drainage problem which will represent a greater expenditure than that required for the excavating. While the excavation now completed allows room for only four tracks, the street viaducts are designed to provide for eight tracks.

On March 1 the terms of office of the following three members of the Labor Board will expire: **A. O. Wharton**, representing the employees; **J. H. Elliott**, representing the railroads, and **G. W. W. Hangar**, representing the public. **B. M. Jewell**, president of the Railway Employees' Department of the American Federation of Labor, will be the Federation candidate to succeed Mr. Wharton, according to recent reports, while it is understood that Mr. Wharton will also be a candidate for renomination.

Free life insurance for employees has been provided by the Delaware & Hudson in a contract with the Metropolitan Life Insurance Company of New York, under which all employees who have been in the service of the road two years or more may have free life insurance to the extent of $500 and may take additional insurance at very low rates up to an amount equal to their respective annual salaries, not to exceed $5,000. This insurance is offered to all employees who have been continuously in service two years or more.

An extensive investigation of the corrosive action of soil on pipes used for gas and water mains and service pipes has been undertaken by the Bureau of Standards in co-operation with the Bureau of Soils, the research sub-committee of the American Committee on Electrolysis and the pipe manufacturers. Forty locations have been selected as representative of the principal classes of soils to be found in the country and at each a number of samples of every kind of iron and steel pipe in commercial use will be buried, these samples to be uncovered and examined from time to time to determine their rate of corrosion. It is expected that some data will be obtained within two or three years, but that the experiment will continue over a period of 8 or 10 years.

The Chicago, Burlington & Quincy has established a pension system to be operated under a plan whereby pensions may be granted among other employees to foremen in track and bridge service who have reached the age of 65 years and to all employees after the age of 70 years is attained, except when upon application of such employees and in the judgment of the board their service does not demand retirement. In the event of physical disability before the age limit has been reached, pensions may be awarded after a continuous service of 25 years. A pension allowance per month is based upon the average of the monthly wages received for the 10 years preceding retirement and is set at one per cent of that amount for each year of continuous service, the allowance, however, to be not less than $1 per year of continuous active service nor less than $25 a month and in no case greater than $150 a month. The entire cost of the system is to be paid by the company without contribution by employees. H. R. Safford, vice-president of the company, has been appointed chairman of the pension board.

Figures recently compiled by the National City Bank of New York and published in its trade record show that there are 740,000 miles of railway in the world, 266,000 of which are in the United States, 220,000 in Europe, 70,000 in Asia, 60,000 in South America, 30,000 in Africa and 26,000 in Australia. The average number of miles of railway for each 1,000 miles of area in the United States is 89 miles; in Europe, 57; in South America, 8; in Australia, 8; in Asia, 4, and in Africa, 2½ miles. Thus, while South America has an area 2½ times larger than the United States, exclusive of Alaska, it has less than one-fourth the railway mileage; Africa while having nearly four times the area of the United States, has only 12 per cent as much mileage; Asia while having nearly six times the area of the United States and eight times the population, has but one-fourth the railway mileage; and Australia with an area equal to the United States, has but one-tenth of the mileage.

The Chicago Region of the Erie has awarded a contract to the A. S. Hecker Company, Cleveland, Ohio, for the maintenance of tracks and the protection of highway crossings on the Chicago, Marion and Cincinnati divisions of that road. According to the plan, all the section foremen, track laborers and crossing watchmen have been released from the service of the railroad company and are now employees of the contractor. The circular issued by the railroad concerning this is as follows:

"Effective January 1, 1922, the maintenance of track and protection of highways on the Chicago, Marion and Cincinnati divisions of the Erie Railroad Company will be handled by the A. S. Hecker Company, contractors, of Cleveland, to whom a contract has been awarded, covering all work incidental to track and crossing operation.

"All track foremen, track laborers and crossing watchmen will be released from the service of the railroad company, effective at midnight of December 31, 1921. All employees desiring to continue work in the employment of the A. S. Hecker Company will be given a chance to signify their intention to a representative of the A. S. Hecker Company."

Personal Mention

General

Charles H. Stein, assistant to the president, Central Railroad of New Jersey, who formerly held various maintenance of way positions, has been promoted to general manager, with headquarters at New York.

Edwin S. Wendt, a member of the engineering board, Bureau of Valuation, Interstate Commerce Commission, in charge of the Eastern district from May 1, 1913, to October 31, 1921, has opened an office in Washington, D. C., for the general practice of engineering in connection with the valuation, financing, consolidation and regulation of railroads, telegraph, water lines and other common carrier properties. Mr. Wendt was graduated from Geneva College in 1881, after which he entered the service of the Pittsburgh & Lake Erie at Pittsburgh, Pa., and until his entry into government service was engineer in charge of construction and maintenance work in various capacities. He was a member of the New York Central Lines Engineering Committee from 1907 to 1913, a member of the commission to inspect the government railroad in Alaska in 1917, and president of the American Railway Engineering Association in 1913.

Engineering

N. S. Brown, assistant to the chief engineer of the Pennsylvania, has resigned to become vice-president of the Dravo Contracting Company, Pittsburgh, Pa.

J. A. Hewes, Jr., has been promoted to division engineer on the Baltimore & Ohio, with headquarters at Washington, Ind.

E. T. Robinson, assistant division engineer on the Southern Pacific, with headquaters at Oakland Pier, Cal., has been promoted to division engineer, with the same headquarters.

J. B. Emerson, assistant engineer of tests of the rail committee of the American Railway Association, with headquarters at Chicago, has been promoted to engineer of tests, with the same headquarters, succeeding M. H. Wickhorst, resigned.

D. G. McKim, assistant engineer on the Kansas, Oklahoma & Gulf, with headquarters at Muskogee, Okla., has been appointed supervisor maintenance of way and structures, with headquarters at Muskogee, Okla., and **O. C. Nonweiler** has been appointed assistant engineer, succeeding Mr. McKim.

D. C. Fenstermaker has been appointed principal assistant engineer of the Chicago, Milwaukee & St. Paul, with headquarters at Chicago, and with such duties as may be assigned to him by the chief engineer, effective February 1. Mr. Fenstermaker was formerly district engineer of the Southern district of this road but has been on leave of absence since April 16, since which time he has been engaged in the construction of a line for the United Fruit Company in Cuba.

Glover B. Copeland, assistant to the engineer maintenance of way of the first division of the Atlantic Coast Line, with headquarters at Rocky Mount, N. C., has been promoted to superintendent of timber preservation with headquarters at Gainesville, Fla. Mr. Copeland was born at Dalton, Ga., on June 12, 1887, and received his technical training at Emory College, from which he was graduated in 1909. He entered railway service in the construction department of the Atlantic Coast Line in September of the same year and from that time until September, 1912, served as an inspector and instrumentman on bridges, masonry and double track work. On the latter date he was promoted to resident engineer, covering various phases of construction work until January 30, 1916, when he was promoted to assistant to the engineer maintenance of the first division, a position which he held up to his recent promotion to superintendent of timber preservation.

Arthur Nelson Reece, division engineer on the Kansas City Southern, has been promoted to chief engineer of that road, the Poteau Valley and the Arkansas Western, and consulting engineer of the Texarkana & Fort Smith, with headquarters at Kansas City, Mo. Mr. Reece entered railroad service in June, 1903, after having studied civil engineering at the University of Kansas for three years. He was successively chainman, rodman, draftsman and instrumentman on the Atchison, Topeka & Santa Fe from June, 1903, to April, 1905, and until March, 1911, was instrumentman, inspector on building construction, assistant engineer and chief clerk to the general superintendent of the St. Louis-San Francisco. He entered the service of the Kansas City Southern in March, 1911, as assistant engineer and in November, 1912, resigned to become chief engineer of the Hanna & Hickey Construction Co., Forth Worth, Tex. In November, 1913, he re-entered the service of the Kansas City Southern as office engineer, with headquarters at Kansas City, and was later promoted to division engineer with headquarters at Texarkana, Tex., which position he was holding at the time of his recent promotion.

John M. Weir has resigned as chief engineer of the Kansas City Southern to become general superintendent of construction of the National Boiler Washing Company, Chicago. Mr. Weir was born in Ireland on July 31, 1879, and entered railway service with the Illinois Central in June, 1899, as a track apprentice. After occupying various positions, he was promoted to resident engineer in charge of construction in March, 1907. Later he was concerned for a time with the construction of a small railway in Canada. After completing this work he returned to this country and entered the service of the St. Louis-San Francisco as an assistant engineer at Springfield, Mo. Subsequent to 1908, he was made assistant engineer in the chief engineer's office in charge of the construction of the Gainesville & Northwestern in Georgia and not long thereafter entered the valuation department of the Chicago, Rock Island & Pacific. He served this company as assistant engineer of track of the Chicago terminal and as assistant engineer in charge of terminal valuation until June, 1916, when he was appointed division engineer of the Kansas City Southern, with headquarters at Pittsburg, Kan. He became chief engineer in March, 1917.

Joseph A. Killian, whose promotion to engineer maintenance of way, of the Middle district of the Southern Railway, with headquarters at Knoxville, Tenn, as announced in a previous issue, was born at Killian, S. C., on September 12, 1833. Mr. Killian was educated at Clemson College in South Carolina, entering railway service later as a rodman on the Savannah division of the Southern at Columbia, Ga., on June 7, 1900. After that date he served consecutively as rodman, levelman and transitman until August 11, 1905, when he was promoted to assistant engineer on the Columbia division with headquarters at Columbia. About one year later he was transferred to the Charleston division with headquarters at Charleston, S. C., where he remained until January 1, 1907, when he was transferred to the Eastern district with headquarters at Charlotte, N. C. On July 1, 1914, he was promoted to resident engineer on the same district, serving in this capacity until June 1, 1919, when he was promoted to roadmaster on the Spartanburg division with headquarters at Spartanburg, S. C., where he remained until his more recent promotion to engineer maintenance of way of the Middle district.

C. B. Brown, Jr., chief engineer, Eastern lines of the Canadian National, has been promoted to engineering assistant to the vice-president of that road. Mr. Brown was born August 27, 1879, at Ithaca, N. Y., and immediately following the completion of engineering studies at Cornell University in 1901, entered railway service as a draughtsman and rodman on the Canadian Pacific at Trail, B. C. The following year he became an assistant engineer in the bridge department and thenceforth until 1904, was resident engineer on the Ontario division. In 1906 he was promoted to division engineer at St. John, N. B., and in 1908 was transferred to Montreal. Four years later he became principal assistant engineer, Eastern lines, with headquarters at Montreal and the following year was promoted to chief engineer of the Canadian Government Railways with headquarters at Moncton, N. B. In 1917 he was appointed assistant general manager, Eastern lines, in addition to his duties as chief engineer, relinquishing the latter title in 1918. The Canadian Government Railways had now become the Eastern lines of the

larger Canadian National system and Mr. Brown remained as chief engineer of these Eastern lines until his appointment as engineering assistant to the vice-president of the entire Canadian National system.

Henry D. Jouett, terminal engineer, Grand Central Terminal improvements, of the New York Central, with headquarters at New York City, has been promoted to chief engineer of the Cleveland Union Terminals with headquarters at Cleveland, Ohio. Mr. Jouett was born at Summerville, Mass., on March 30, 1878, receiving his technical training at the Massachusetts Institute of Technology, from which he was graduated in 1900. He entered railway service in June of the same year as a rodman in the division engineer's office at Albany, N. Y. One month later he was promoted to inspector of erection of bridges, holding this position until April, 1901, when he was promoted to assistant supervisor of track. In April, 1902, he was promoted to assistant in the division engineer's office at Albany, where he remained until August, when he left the employ of the railroad to go with a building contractor. Mr. Jouett re-entered the employ of the New York Central in February, 1903, in connection with the electrification work on the New York district and since that time has successively served as transitman, assistant engineer on construction, resident engineer, designing engineer on the electric zone improvements and later on the west side improvements in New York City, and terminal engineer, the position which he held at the time of his latest promotion.

W. H. Coverdale, consulting engineer, New York City, has been appointed consulting engineer of the reorganized Chicago & Eastern Illinois. He was born at Kingston, Canada, in 1871, and studied at Geneva College, Beaver Falls, Pa., from which he graduated in 1891 with a degree of bachelor of arts, and in 1914 received the doctor's degree in science. From 1892 to 1900 he was in the service of the Pennsylvania Lines, West, as a rodman, instrumentman and assistant engineer, and during the last three years of that period was track elevation engineer in charge of the Pittsburgh, Fort Wayne & Chicago track elevation from 47th street to Park Manor, Chicago. From 1901 to 1903 Mr. Coverdale was employed as a civil engineer by a New York firm of engineers and contractors, and since 1904 has practiced as a consulting engineer, specializing in railroad and industrial management and financing. In addition to his recent election as director and his appointment as consulting engineer of the Chicago & Eastern Illinois, Mr. Coverdale is chairman of the board of directors of the Pittsburgh & West Virginia, and of the Pittsburgh Terminal Railroad & Coal Company; he is president and a director of the West Side Belt; a director and consulting engineer of the Gulf States Steel Company, and of the Gulf, Mobile & Northern; a director of the Meridian & Memphis; and ancillary receiver of the Connecticut Brass & Manufacturing Corporation.

W. H. Coverdale

Track

A. D. Schader has been appointed roadmaster on the River Division of the Chicago, Milwaukee & St. Paul, with headquarters at Wabasha, Minn., succeeding **H. C. Kassabaum.**

Louis Doerr, section foreman on the Grand Trunk, Western Lines, has been promoted to supervisor of track, with headquarters at Durand, Mich., succeeding **H. F. Sullivan,** who has been transferred to Grand Rapids, Mich., in place of **John Lockert,** retired. Mr. Doerr was born at Mitchell, Ontario, on January 7, 1872, and entered railway service with the Detroit, Grand Rapids & Western (now the Pere Marquette) in July, 1889, where he served as a section foreman until 1907. He entered the service of the Grand Trunk on May 5, 1907, and in March, 1909, was transferred to Saginaw, Mich., where he was located at the time of his recent promotion.

George T. Anderson, roadmaster on the Kansas City Southern, with headquarters at Spiro, Okla., has been promoted to general roadmaster, with headquarters at Texarkana, Tex., with jurisdiction over the engineering and roadway departments.

Purchases and Stores

E. Gardner Thorpe has been appointed general storekeeper of the Long Island, succeeding **Eugene Wright,** promoted.

G. W. Bichlemeir, purchasing agent of the Union Pacific with headquarters at Omaha, Nebr., has been promoted to general purchasing agent, with the same headquarters.

C. B. Tobey, assistant general storekeeper of the Lehigh Valley, with headquarters at Packerton, Pa., has been promoted to general storekeeper, with the same headquarters, suceeding **C. C. Huntington,** resigned on account of ill health.

Obituary

J. H. Collins, division storekeeper on the Southern Pacific, with headquarters at Los Angeles, Cal., died of pneumonia December 4 at his home in that city.

J. R. Walsh, pioneer railroad builder and financier and formerly president of the Southern Indiana, died on January 11 at his home in Chicago.

Thomas J. Moriarity, retired roadmaster on the Atchison, Topeka & Santa Fe, died at his home in Abilene, Kan., on December 27, 1921. He was born in Ireland and entered railway service with the Santa Fe in 1878, being promoted to roadmaster on the Strong City-Superior branch in 1898, which position he held until his retirement, on account of ill health, in 1911.

Frank Button, roadmaster on the Chicago & North Western, with headquarters at Lake City, Iowa, died on December 21, 1921. Mr. Button was born December 22, 1862, at Glenmore, N. Y., and entered railway service with the Chicago & North Western on April 26, 1898, as a roadmaster's clerk at Sterling, Ill. From November 22, 1902, until May, 1904, he served as assistant roadmaster at Sterling, Ill., and on the latter date was appointed section foreman at Milwaukee, Wis., from which position he was promoted to assistant roadmaster at Milwaukee in September, 1904. Mr. Button was promoted to roadmaster at Lake City, Iowa, in November, 1904, in which position he was actively engaged up to the time of his death.

The decline of both freight and passenger traffic in 1921 was the largest on record in this country. The net ton miles of freight service rendered in the first 10 months of the year was 23 per cent less than in the first 10 months of 1920. The next largest slump on record was that which occurred in 1894, which was 14.5 per cent less than in 1893. The decline in passenger business in the first 10 months of 1921 was 19.3 per cent less than in the same period in 1920 as compared with 14.5 per cent slump in the passenger traffic in 1895 over that of 1894.

The Erie Railroad has recently inaugurated a new method of handling freight at the port of New York, which combines the features of the store door delivery and the container car ideas. The plan has been developed to the point where the road now has two inland freight forwarding and receiving stations in actual operation with arrangements for the proper complement of trucks and trailers. The plan involves the breaking of bulk of all domestic freight, excepting a few products such as perishables and dairy products, at Jersey City, and instead of moving the cars across the river on car floats, of transferring the freight to automobile trucks or to tractors or trailers which are then transported to the city by the ferries, after which the trucks or trailers travel direct to whatever point the merchandise is to be delivered.

Construction News

The Arizona Eastern, in conjunction with the Atchison, Topeka & Santa Fe, will construct a union station at Phoenix, Ariz., the plans for which have been prepared. Bids will be requested as soon as several agreements between the companies have been reached.

The Atchison, Topeka & Santa Fe closed bids February 1 for the rebuilding of a bridge across the Des Moines river at Dumas, Mo., the work to cost about $80,000. This company has awarded a contract to the Federal Engineering Company, Chicago, for the installation of oil-handling facilities, including a steel trough 380 ft. in length, a pump, and numerous pipe lines, at Argentine, Kan., estimated to cost $18,000. This company closed bids on January 25 for extensions and improvements to its machine shops at San Bernardino, Cal., estimated to cost $224,000. This company will make repairs and alterations to its grain elevators at Argentine, Kan., at an estimated cost of approximately $15,000.

The Canadian Pacific, in conjunction with the Canadian National, is contemplating the construction of a union station at Peterborough, Ont.

The Central of Georgia, noted in the January issue as closing bids for the construction of a 500-ton concrete coaling station at Columbus, Ga., has awarded the contract for the work to the Ogle Construction Company, Chicago.

The Chicago, Burlington & Quincy awarded a contract to H. O. Hirsh, St. Louis, on January 21, for the construction of a passenger depot at Earle, Ark.

The Chicago, Burlington & Quancy closed bids on January 27 for the construction of an addition and alterations to its hotel and eating house at Cody, Wyo., this structure to be two stories high. This road, noted in the January issue as contemplating the construction of a passenger station at Aurora, Ill., has applied to the Illinois Commerce Commission for authority to proceed with this work.

The Chicago Great Western closed bids February 1, for the construction of a steel coaling station at Chicago, and is accepting bids for the repair of its elevator at Omaha, Nebr.

The Chicago, Milwaukee & Gary, noted in the January issue as having applied to the Interstate Commerce Commission for authority to construct an extension between Aurora, Ill., and Joliet, a distance of approximately 29 miles, between which points the company now operates over the tracks of the Elgin, Joliet & Eastern, has received permission to build this line. The cost of this work is estimated at $2,700,000.

The Chicago, Rock Island & Pacific has awarded a contract to the Miller Heating Company, Chicago, for the installation of a boiler washing system in its roundhouse at Chickasha, Okla., this work to cost approximately $30,000. Later a water heating plant will also be installed in connection with the above. This road has awarded a contract to the Railroad Water & Coal Handling Company, Chicago, for the construction of a frame coaling station at Booneville, Ark., at a cost of approximately $20,000.

The Chicago Union Station has awarded a contract to the Lamson Company, Boston, Mass., for the conveyors, chutes, and other mechanical handling equipment to be installed in the $4,000,000 railway mail terminal now being constructed as a part of the Chicago Union Station project. This company will soon accept bids for the wrecking of the old baggage building on Canal street between Jackson and Adams streets. Following the wrecking of this building the concourse of the new station will be constructed.

The Darco Corporation contemplates the construction of a 10-mile line to extend from Marshall, Tex., to the Darco territory.

The Dodge City & Cimarron (A. T. & S. F.) has applied to the Interstate Commerce Commission for authority to construct an extension to its lines from Satanta, Kan., through Haskell, Grant and Stanton counties, a distance of approximately 55 miles.

Ecuador, South America—The congress of Ecuador has authorized the awarding of contracts for the completion of the Quito-Esmeraldas, the Sibaumbe-Cuenca, and the Ambato-Curary railroads.

The Fort Worth & Denver City has awarded a contract to Joseph E. Nelson & Sons, Chicago, for the construction of a two-story brick hotel at Texline, Tex., to cost $75,000, and has awarded a contract to the Federal Engineering Company, Chicago, for the installation of a heating and plumbing system in this building to cost $15,000.

The Gulf, Colorado & Santa Fe noted in the January issue as contemplating the construction of a two-story freight depot at Brenham, Tex., is now accepting bids for this work. It involves a two-story office building, 32 ft. by 36 ft., a warehouse, 32 ft. by 74 ft.; and a concrete platform 32 ft. by 128 ft. The structure will be of brick construction with concrete floors, tar and gravel roof and cut stone interior. The entire cost will approximate $44,000.

The Iberia & Vermillion has been ordered by the Louisiana Public Service Commission to enlarge its station at Abbeville, La., to repair the structure, and to construct a passenger waiting shed not less than 30 ft. in length and the width of the present station, all of which must be commenced by the middle of March, 1922.

The Illinois Central, noted in the January issue as receiving bids for the construction of a car repair shed at McComb, Miss., has awarded the contract for this work to the Ellington-Miller Company, Chicago. The building will be 600 ft. by 176 ft., with concrete foundation and steel superstructure, and with a cement tile roof, the entire cost to be about $140,000. The same company, also noted in the above-mentioned issue as accepting bids for the construction of a frame viaduct over its tracks at Fulton, Ky., estimated to cost $15,000, awarded the contract for the work also to the Ellington-Miller Company. This road will construct a third track from Matteson, Ill., to North Junction, a distance of about 10 miles, and from Tucker to Kankakee, a distance of approximately 5 miles, the work to include the reduction of grades.

The Illinois Terminal has obtained authority from the Interstate Commerce Commission to construct an extension from Le Clair to O'Fallon, Ill., 14 miles, the work to cost approximately $650,000.

The Indianapolis & Cincinnati Traction will construct an extension to its lines from a point in Indiana to Cincinnati, Ohio, and the rapid transit commission of Cincinnati will undertake the construction of a 17-mile approach to the city which will extend to the point of intersection with the Indianapolis & Cincinnati Traction. A 2½-mile tunnel through which the interurban will gain entrance into the city has been completed.

The Intermountain Coal & Lumber Co. contemplates the construction of a railroad, of approximately 12 miles, to extend from near Poorfork, Ky., on the Cumberland Valley division of the Louisville & Nashville, into the Grassy and Bad creek territory.

The Interstate has awarded a contract to the McClintic-Marshall Company, Pittsburgh, Pa., for the fabrication and erection of 15 deck plate girder bridges for its Guest river extension and seven deck plate girder and four half through girder bridges to replace those in its main line between Appalachia and Norton, Va.

The Jackson & Eastern has awarded a contract to J. N. McLeod, Jackson, Miss., for the construction of 11 miles of line from Currans Crossing, Miss., to Pelahatchie Creek. This is a part of a 61-mile extension recently authorized by the Interstate Commerce Commission and which it is intended to complete during the present year.

The Lehigh Valley has submitted preliminary plans to the Board of Utility Commissioners and to the city authorities proposing the elimination of two grade crossings at Perth Amboy, N. J.

The Los Angeles & Salt Lake has awarded a contract to the Lynch-Cannon Company, Salt Lake City, Utah, for the construction of a two-story office building, 80 ft. by 200 ft., and a one-story freight depot, 50 ft. by 600 ft., at Los Angeles, Cal., these structures to be of reinforced concrete and

of brick construction, and to involve a total expenditure of approximately $200,000.

The Louisiana Railway & Navigation is preparing plans for the construction of a new station at New Orleans, La., and is also planning to call for bids for the construction of a gravel washing plant estimated to cost about $50,000.

The Louisville & Nashville closed bids January 30, for the construction of a Y. M. C. A. building at Hazard, Ky. The company contemplates the construction of a packing and shipping shed at Biloxi, Miss.

The Minneapolis & St. Louis, in conjunction with the Great Northern, has prepared plans for the construction of a steel bridge approximately 520 ft. in length and 82 ft. in width, the bridge to be located over the railroad's tracks at Fifth street, North Minneapolis, and to cost about $200,000.

The Minneapolis, St. Paul & Sault Ste Marie, in conjunction with the Chicago & North Western, and the city of Ironwood, Mich., will receive bids until March 1, for the construction of a reinforced concrete viaduct 1,500 ft. in length over 23 tracks at Mansfield street, Ironwood, to cost $220,000.

The Minerets & Western is receiving bids for the construction of a 35.5 mile standard-gage railroad extending from Fresno, Cal., into timber lands. This work is to include the grading, filling, excavating, trestle construction, masonry, etc. In addition the Sugar Pine Lumber Company will construct a 19.5 mile extension from the new terminus of the Minerets & Western into its timber property. The construction work of the entire 55-mile line is estimated to cost $2,500,000.

The Missouri, Kansas & Texas has awarded a contract to the Graver Corporation, Chicago, for the construction of a type "K" ground operated water treating plant at Parsons, Kan. The plant will have a treating capacity of 50,000 gal. of water each hour and a storage capacity at the top of main settling tank capable of holding 200,000 gal. of treated water.

The Missouri, Kansas & Texas, noted in the August issue as contemplating extensive construction work in connection with a new freight terminal, including buildings, a yard and connections at Denison, Tex., has now prepared definite plans for the project. The work involves the acquiring of 400 acres of land; the laying of 57 miles of track; the construction of culverts aggregating 6,000 cu. yd. of concrete; 800,000 cu. yd. of grading; a 22-stall roundhouse and shop; a power house, a store house and other locomotive and car facilities, the entire cost of which is estimated at $3,000,000. The necessary land has been purchased and a contract for the grading and the culverts has been awarded to the C. R. Cummins Company, Cleveland, Ohio. It is expected that bids for the buildings and structures will not be called for before spring. This road will construct a brick and stucco passenger station at Highland Park (Dallas), Tex., estimated to cost $17,000.

The Missouri Pacific closed bids on January 16 for the construction of a station at Nashville, Ark., estimated to cost $12,000. This road will construct a new passenger station, 24 ft. by 115 ft. of fireproof hollow tile and stucco construction with a slate roof, and reinforced concrete and hardwood floors, at Earle, Ark. A concrete foundation for this building has recently been completed by company forces, and it is expected that bids for the construction of the superstructure will be requested at an early date. The work will cost about $23,000. This road, noted in the January issue as accepting bids for the construction of a frame freight and passenger station at Zeigler, Ill., and the remodeling of a brick roundhouse at Coffeyville, Kan., has awarded a contract for this work to J. D. Fitzgibbon, St. Louis, Mo. This company has awarded the contract for the construction of a station at Nashville, Ark., to J. D. Fitzgibbon, this work to cost about $12,000.

The Mobile & Ohio is now constructing coal and cinder handling facilities at Jackson, Tenn., estimated to cost $25,000.

The National Railways of Mexico have awarded a contract to Dudley & Orr, El Paso, Tex., for the grading of 47 miles of railroad, extending from Lucero, Mex., to the property of the Eruption Mining Company. This work will include the placing of corrugated iron culverts as well as grading.

The New York Central has awarded a contract to the Walsh Construction Company, Syracuse, N. Y., for grade elimination at North Tonawanda, N. Y., to cost in the neighborhood of $500,000. The work involves a change of line and the contract includes track work, bridge work and grading.

The Norfolk & Western has awarded a contract to the Roberts & Schaefer Company, Chicago, for a reinforced concrete coaling station, including mechanical equipment, to be constructed at Williamson, W. Va., at an approximate cost of $75,000.

The Northern Pacific, in conjunction with the Great Northern, is planning for extensive grade crossing elimination work in northeast Minneapolis, Minn. The preliminary plan which was prepared by the city and accepted by the companies provides for track elevation, including twelve bridges, which will accommodate from two to six tracks. The work is estimated to cost $5,000,000 and, according to an ordinance recently passed by the city council, must be completed within five years. This road contemplates the removal of its tracks from the University of Minnesota campus and the construction of a bridge, 1,200 ft. in length, over the Mississippi river at Minneapolis, which projects are estimated to cost $2,000,000, of which the state will contribute $750,000. This company also plans the construction of a 300-ft. tunnel at Plateau, Mont., estimated to cost $107,000; and the construction of a 60-ft. concrete subway under six tracks at Livingston, Mont., estimated to cost approximately $100,0000.

The Oklahoma Railway contemplates extending its line from Guthrie, Okla., to Stillwater, a distance of about 30 miles, at an estimated cost of $1,200,000.

The Pacific Fruit Express has awarded a contract to D. W. Wagner, San Francisco, for the construction of a reinforced concrete addition to its ice plant at Calwa, Cal.

The Philadelphia & Reading has awarded a contract to A. L. Carhart, Philadelphia, for the erection of a 60-ft. span concrete arch to carry a highway over its Frackville branch at Mill Creek, Jct., near Port Carbon, Pa.

The St. Louis-San Francisco is now making a survey in connection with a contemplated extension of its lines from Vinita, Okla., northwest into the coal fields of the Central Coal & Coke Company, of Kansas City, Mo., a distance of about 20 miles.

This company will receive bids until February 20, for the construction of a four-story hospital at Springfield, Mo., to cost approximately $700,000.

The Southern Pacific will construct a new subway to replace the old North Main street tunnel in Houston, Tex., this structure to carry 19 tracks, to provide 21 ft. passageways for highway and street railway traffic and an 8 ft. tunnel for pedestrians. Plans have been prepared and proposals are now being requested. The project will cost approximately $200,000.

The Tennessee Central contemplates extending its line from Hopkinsville, Ky., to Paducah, a distance of about 70 miles.

The Union Pacific, in conjunction with the city of Denver, Col., will construct a viaduct in that city, extending from Twenty-sixth and Market streets, north across the Union Pacific tracks. The work will involve an expenditure of approximately $500,000, and will be handled by the city under a contract which has not yet been awarded.

The Virginian has awarded a contract to the Federal Engineering Company, Chicago, for the installation of a heating plant in its new roundhouse at Elmore, W. Va., to cost $15,000.

The Wenatchee Southern, noted in the December issue as having been organized to construct a railroad from Wenatchee, Wash., to Kennewick, a distance of approximately 132 miles, has applied to the Interstate Commerce Commission for the requisite authority.

The Western Pacific has been authorized by the State Railroad Commission of California to extend its San Jose branch across the Santa Cruz line of the Southern Pacific at College Park, Cal. This permission was granted after the above lines agreed to install an interlocking plant at that point which will be in operation on or about March 15.

Equipment and Supplies

The Carolina, Clinchfield & Ohio has ordered 5,000 tons of rail from the Tennessee Coal, Iron & Railroad Company.

The Florida East Coast has ordered 2,500 tons of rail from the Tennessee Coal, Iron & Railroad Company.

The Chicago Union Station, through Graham, Anderson, Probst & White, architects, has awarded a contract to the American Bridge Company for about 17,000 tons of structural steel.

The Government Railways of Japan have ordered through Mitsui & Co., New York, 13,000 tons of 75-lb. and 60-lb. rail, from the United States Steel Products Company.

The Grand Trunk, Western lines, has ordered 9,500 tons of 100-lb. rail from the Illinois Steel Company.

The Kansas City Southern has awarded a contract for 6,000 tons of rails to the Illinois Steel Company.

The Louisville & Nashville has ordered 50,000 tons of rail from the Tennessee Coal, Iron & Railroad Company.

The New York Central will receive bids until 12 o'clock noon February 3, for its requirements of track bolts, splice bars, frogs, switch points, track switches complete, offset splice bars, iron pipe farm gates, fence wire, crossing frogs, double curved frogs and railroad crossings, and will receive bids until 12 o'clock noon, February 8, for the requirements of subsidiary companies of track spikes and angle bars.

The Norfolk & Western will receive bids until 12 o'clock noon February 8, at Roanoke, Va., for 2,100 lbs. of tie dating nails and 1,726,459 tie plates; also for 1,100 bars of reinforcing steel, 120 billets of welding steel, 1,000 sheets of polished steel; 500 tons of steel rail and 150 steel ties.

The Minarets & Western has ordered 10,000 tons of 60 and 75-lb. rail from the American representative of the Forges de la Providence Marchienne-Au-Port, Belgium, and has purchased 300 tons of bridge steel from the American Bridge Company.

The Pennsylvania Railroad has placed orders for 80,000 tons of rail, chiefly of 130-lb. section, for 1922 delivery as follows: The Carnegie Steel Company, 40,000 tons; the Bethlehem Steel Company, 18,000 tons; the Cambria Steel Company, 18,000 tons, and the Lackawanna Steel Company, 4,000 tons. The company has unfilled orders from 1921 and rail on hand totaling 74,000 tons which, with the new orders gives the company a total of 154,000 tons for use in 1922.

The Southern is inquiring for prices on 26,600 tons of 85-lb. rail and 8,500 tons of 100-lb. rail.

PROGRESS IN FEDERAL VALUATION

The valuation section of the Interstate Commerce Commission has issued the following figures showing the amount of work thus far completed:

ENGINEERING SECTION

	Mileage	Percentage
Road mileage assigned	247,882	100.0
Field work entirely completed	247,882	100.0
Field notes collected	224,300	90.5
Prices applied	168,960	68.2
Reports assembled	149,700	60.4
Reports completed on 635 corporations covering	143,879	58.1

LAND SECTION

Road mileage assigned	247,882	100.0
Mileage appraised	245,752	99.2
Mileage computed	222,948	90.0
Mileage compiled	133,294	53.8
Reports completed on 591 corporations covering	131,857	53.2

ACCOUNTING SECTION

Road mileage assigned	247,882	100.0
Field work completed except verification of returns to valuation orders	245,394	99.0
Verification of returns to valuation orders.	242,844	98.0
Reports rough drafted	153,775	62.1
Reports completed on 471 corporations covering	84,091	33.9

Supply Trade News

General

The Dayton-Dowd Company, Quincy, Ill., has opened a district office at 809 Keenan building, Pittsburgh, Pa., in charge of T. J. Barry, who has been in the engineering and sales departments in the Quincy office for several years.

Black-Matthews Company, Inc., 25 Church street, New York City, has been organized by **Edward J. Matthews** and **J. Nelson Black** to transact business in iron and steel products, together with machinery and railway equipment.

The Automatic Railway Gate Company, Milwaukee, Wis., has been incorporated with a capital stock of $5,000, to manufacture safety devices for railroad crossings. The incorporators are **Frank P. Mansfield,** 426 Thirty-first street, and **Ottmar Kloetzner, Jr.**

The Hauck Manufacturing Company, Brooklyn, N. Y., has moved its Philadelphia office to 1726 Sansom Street and **Herbert Vogelsang,** who has been connected with the company for six years, has been placed in charge.

The Missouri Tie & Lumber Company has been organized and offices established in the Railway Exchange building, St. Louis, Mo. **C. O. Deabler,** formerly with the Abeles & Taussig Tie Company and prior to that tie and timber agent of the Southwestern region of the United States Railroad Administration, is president and **James J. Searcy** secretary-treasurer.

The Ohio Structural Steel Company has established a plant at Newton Falls, Ohio. **M. H. Stauffer,** formerly of the Niles Forge & Manufacturing Company, Niles, Ohio, has been appointed president and general manager and **J. S. Mitchell,** formerly with the Kansas City Structural Steel Company, Kansas City, Mo., chief engineer.

The Warren Tool & Forge Company, Warren, Ohio, has purchased the American Block & Manufacturing Company and the General Malleable Company, both of the same city. The American company manufactures malleable unions with bronze inserted seats, for the production of which the plant has a capacity of about 250,000 per month. The General Malleable Company manufactures malleable castings, a large proportion of which are used by the railroads and the total capacity for the production of which is about 600 tons per month. These companies will henceforth be operated as a part of the Warren Company, the capitalization of which under the merger is $1,800,000. The company will continue to operate under the present management.

The Portland Cement Association, Chicago, has organized a railway bureau to compile and present authoritative data on railway uses of concrete. **D. A. Tomlinson,** who has been appointed manager of this bureau, was graduated from the Massachusetts Institute of Technology in 1912, following which he entered the engineering department of the Chicago & Western Indiana. Five years later, while occupying the position of assistant engineer of that road, with headquarters at Chicago, Mr. Tomlinson enlisted in the army, serving as a captain in the coast artillery and instructor in railway artillery and orientation at the heavy artillery camp at Fort Monroe, Va. For the past two years he has been connected with the structural bureau of the Portland Cement Association, with headquarters at Chicago.

Personal

Walter Hasendahl, 1213 Fuller avenue, Los Angeles, Cal., has been appointed representative of the Orton & Steinbrenner Co., Chicago.

Robert C. Weller, formerly industrial agent of the New York Central Lines West, and more recently general sales manager of the Lakewood Engineering Company, has been elected president of the Marsh-Capron Manufacturing Company, Chicago, manufacturers of rail track concrete mixers.

Carl F. Bledsoe, secretary of the Ogle Construction Company, Chicago, has been elected president of the company, to succeed Robert A. Ogle, deceased; **M. W. Powell,** vice-presi-

dent, has been elected vice-president and secretary; and **J. G. Forster,** vice-president in charge of sales, has been elected vice-president and treasurer.

C. W. Johnson, formerly of the Chas. W. Johnson Lumber Company, Seattle, Wash., has been elected vice-president of the **Duncan Lumber Company,** Portland, Ore., and will take charge of general operations, effective February 1. **C. D. McCoy,** formerly sales manager of the company, has been elected vice-president and will take charge of the eastern sales of the company, with headquarters in the McCormick building, Chicago.

W. H. Graul, department sales manager, and **J. J. Hughes,** manager of the order department of the American Steel Foundries, Chicago, have organized the firm of **Hughes & Graul,** manufacturers representatives, with headquarters in the Peoples Gas building, Chicago. The company will represent The Ohio Steel Foundry Company, Lima, Ohio, cast steel manufacturers, and The McConway & Torley Company, Pittsburgh, Pa.

Alfred E. Pratt, sales engineer of the **National Carbon Company, Inc.,** Cleveland, Ohio, has been appointed assistant manager of the railroad department, with headquarters at Cleveland. Mr. Pratt was born at West Scarborough, Maine, December 11, 1887, and studied at Mount Union College and Western Reserve University. After leaving college he spent two years in the maintenance of way department and on signal construction on the western lines of the Erie. In October, 1909, he was appointed supervisor of signals of the Buffalo Creek Railroad at Buffalo, N. Y. In January, 1913, he became general signal foreman of construction with the Erie while automatic signals were being installed on four divisions, and in November, 1916, was appointed signal supervisor of the Buffalo division of the Erie. In April, 1917, he was transferred to the Kent division, with headquarters at Marion, Ohio. On March 1, 1918, he resigned to accept the position as sales engineer in the railroad department of the National Carbon Company.

A. E. Pratt

J. G. Forster, vice-president in charge of sales of the Ogle Construction Company, Chicago, who has recently acquired the added duties of treasurer, was born in Baltimore, Md., in 1893. After graduating from the Baltimore Polytechnic Institute, he superintended the construction of the bulk sales distributing stations for an oil jobbing company of Baltimore, which position he occupied until 1917. During the war he served as an officer in charge of fuel, under the depot quartermaster at Atlanta, Ga., and upon his discharge in 1919 became associated with the Ogle Construction Company.

Carl F. Bledsoe, elected president of the Ogle Construction Company, Chicago, was born in Texas in 1881, and after completing a collegiate course enrolled as a student of the International Correspondence School, completing the course in civil engineering. He entered business with the Gurley Engineering Company at St. Louis, Mo., in 1904, as a draftsman and structural engineer, and from 1906 to 1911 was associated with the Otto Gas Engine Works at Chicago as structural engineer in its railway construction department. During the latter year, in conjunction with Mr. Ogle, he helped organize the Ogle Construction Company, from which time he has served the company as secretary, and also supervising the engineering and construction policies of the company.

M. W. Powell, who has been elected vice-president and secretary of the Ogle Construction Company, Chicago, succeeding Mr. Bledsoe, was born in Georgia, and completed a course of study in mechanical engineering at the Kentucky State University in 1905. Immediately following his graduation he entered the engineering department of the Chicago & Alton, and during 1906 was office engineer of the Chicago, Indiana & Southern. From 1909 to 1913 he was designing engineer of locomotive fuel and water stations for the Otto Gas Engine Works and the T. W. Snow Construction Company, and in 1913 became vice-president of the Ogle Construction Company in charge of engineering, which office he will continue along with his newly acquired duties as secretary.

Porter L. Laughlin has been appointed district sales manager and **Frank B. Nimmo,** assistant district sales manager, in charge of the Chicago region of the Verona Tool Works, Pittsburgh, Pa. Mr. Laughlin was born on March 29, 1891, at Tarentum, Pa., and attended Washington and Jefferson College. In 1913 he became connected with the Central Tube Company, Pittsburgh, Pa., with which he served successively as purchasing agent, assistant to the general manager and special representative until December 1, 1920, excepting for the period from September, 1917, to February, 1919, when he served in the army as a lieutenant in the infantry. In December, 1920, Mr. Laughlin entered the service of the Verona Tool Works as assistant district sales manager at Chicago and for a few months prior to his recent appointment was acting district sales manager at Chicago.

Mr. Nimmo, who has been appointed assistant district sales manager, was born in Pittsburgh, Pa., on September 8, 1897, and entered the employ of the Central Tube Company on September 1, 1913, with which he served in various capacities until November 1, 1920, when he became associated with the Verona Tool Works. On February 1, 1921, he was transferred from the Verona plant at Verona, Pa., to the Chicago office as a representative, and served in this capacity until his recent appointment to assistant district sales manager.

Trade Publications

Gunite.—A book of views showing recent work done by the Cement Gun Construction Company, Chicago, has recently been issued by that company. The work illustrated covers a wide variety of structures including encasing of structural steel bridges, the coating of masonry arches and tunnel linings and the construction of small concrete units such as telephone booths.

Fairmont Motor.—The Fairmont Gas Engine and Railway Motor Car Company of Fairmont, Minn., has issued a 20-page pamphlet illustrating and describing the Fairmont motor. The first few pages illustrate and describe the use of this motor on cars for hauling track gangs and bridge and building gangs as well as material and the remaining portion of the booklet is devoted to detailed account of the various mechanical parts of the motor, pointing out its different advantages.

Concreting Equipment.—A 64-page illustrated booklet has been prepared for circulation by the Lakewood Engineering Company, Cleveland, Ohio, describing and illustrating its various types of concrete placing and chuting equipment manufactured for use in concrete construction work. The booklet is well illustrated with photographs showing actual installations of the chuting equipment on various construction jobs throughout this and other countries, and, aside from considerable descriptive matter, contains detailed specifications of all of the types and sizes of the Lakewood chute sections, steel towers, sliding frames, elevator buckets, etc., together with blueprint dimension sketches of the details of this equipment. The booklet is published as the company's bulletin 23-C.

Crawling Tractor Crane.—An eight-page booklet has been issued by the Industrial Works, Bay City, Mich., with reference to the "Industrial" crawling tractor cranes. This booklet opens with an article on the value to be derived from the use of power operated cranes in railway and other industrial service, gives some space to developing the history of the company as a manufacturer of industrial cranes and devotes the remaining space to the illustrating and describing of the construction and application of the crawling tractor cranes manufactured by the Industrial Works.

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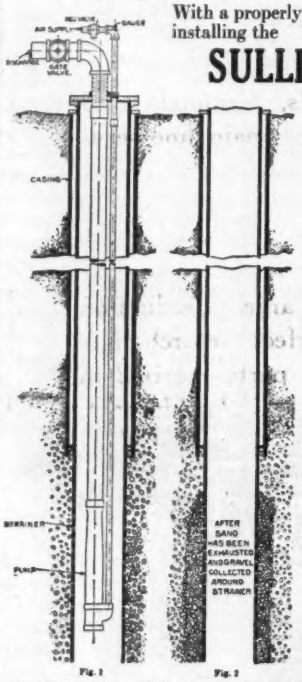

Fig. 1 Fig. 2

system of pumping and "Back-Blowing," clogging can be—and is prevented. Results are partly shown in these two sketches.

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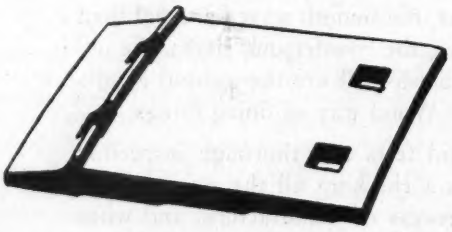

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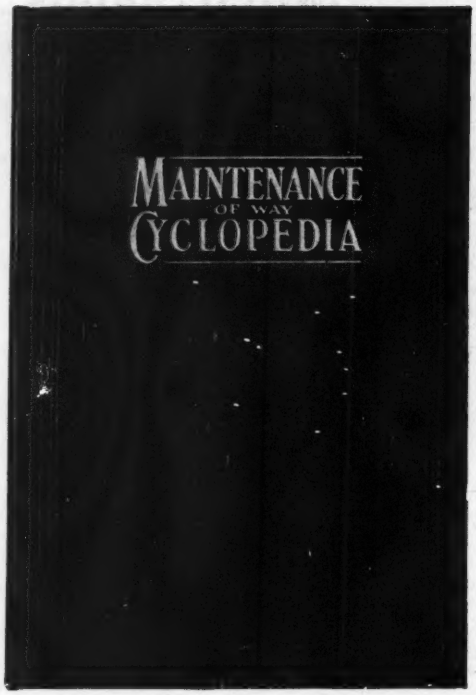

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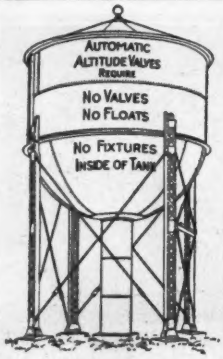

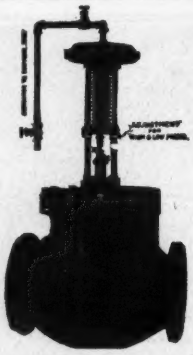

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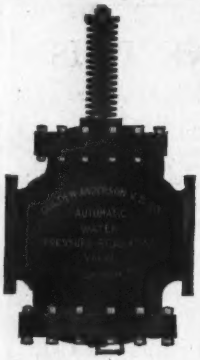

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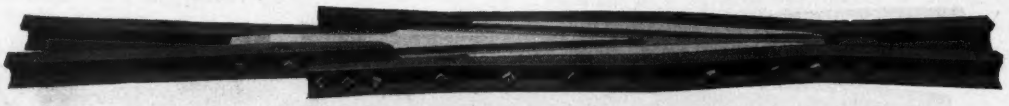
Track Work of Rail and Manganese Steel Construction

Manufacturers of Balkwill Articulated Cast Manganese Crossings

CINCINNATI - - - OHIO

SPECIAL TRACK WORK

MANGANESE STEEL AND PLAIN RAIL CONSTRUCTIONS

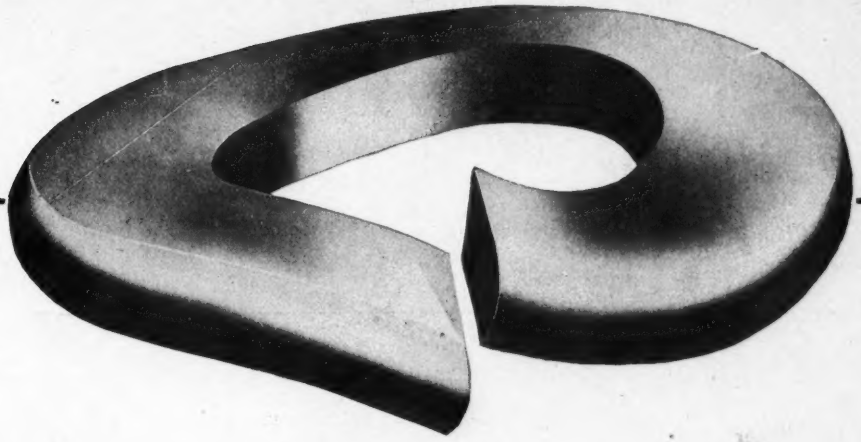


A. R. E. A. Standard No. 10 Railbound Manganese Steel Frog.

Originators of the Use of Manganese Steel in Track Work

WM. WHARTON JR. & CO., Inc., EASTON, PENNA.

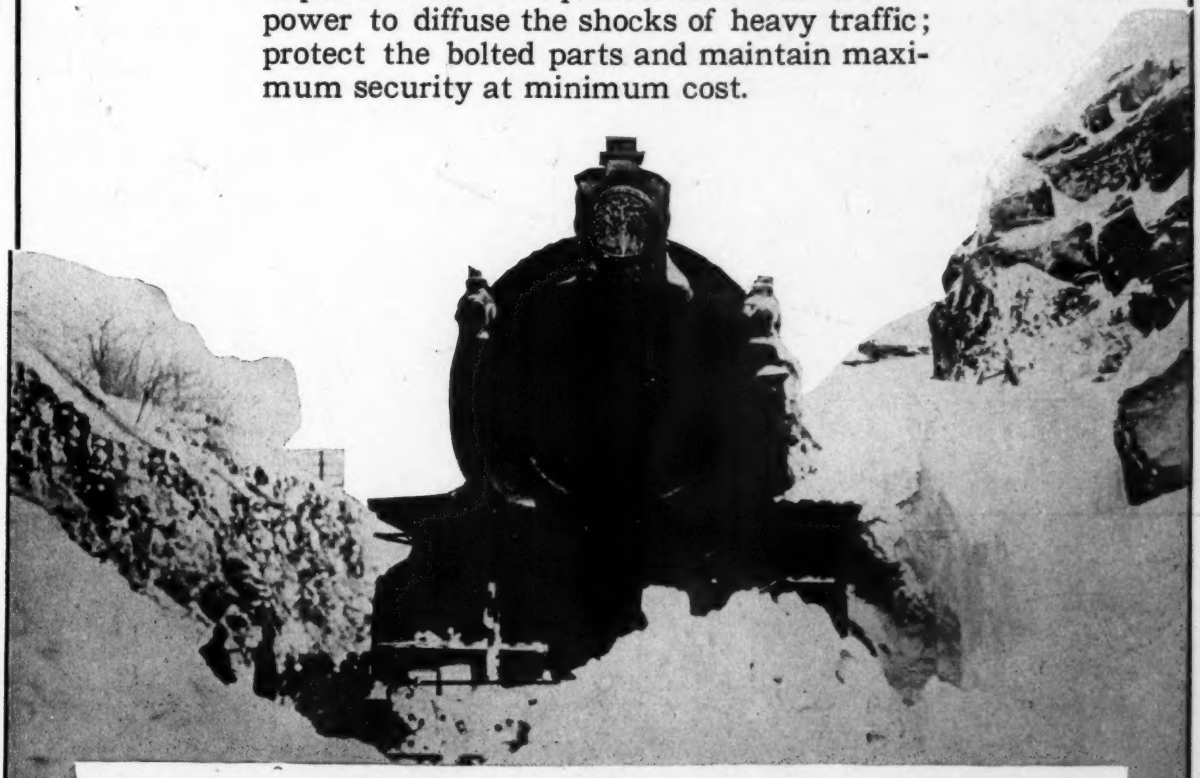
Subsidiary of Taylor-Wharton Iron & Steel Co., High Bridge, N. J.



HIPOWERS Help You Through

WINTER months add many hardships to railroading. When tracks are snow covered it is impossible for the track man to make adequate inspection.

Hipower Nut Locks possess sufficient reactive power to diffuse the shocks of heavy traffic; protect the bolted parts and maintain maximum security at minimum cost.



THE NATIONAL LOCK WASHER COMPANY

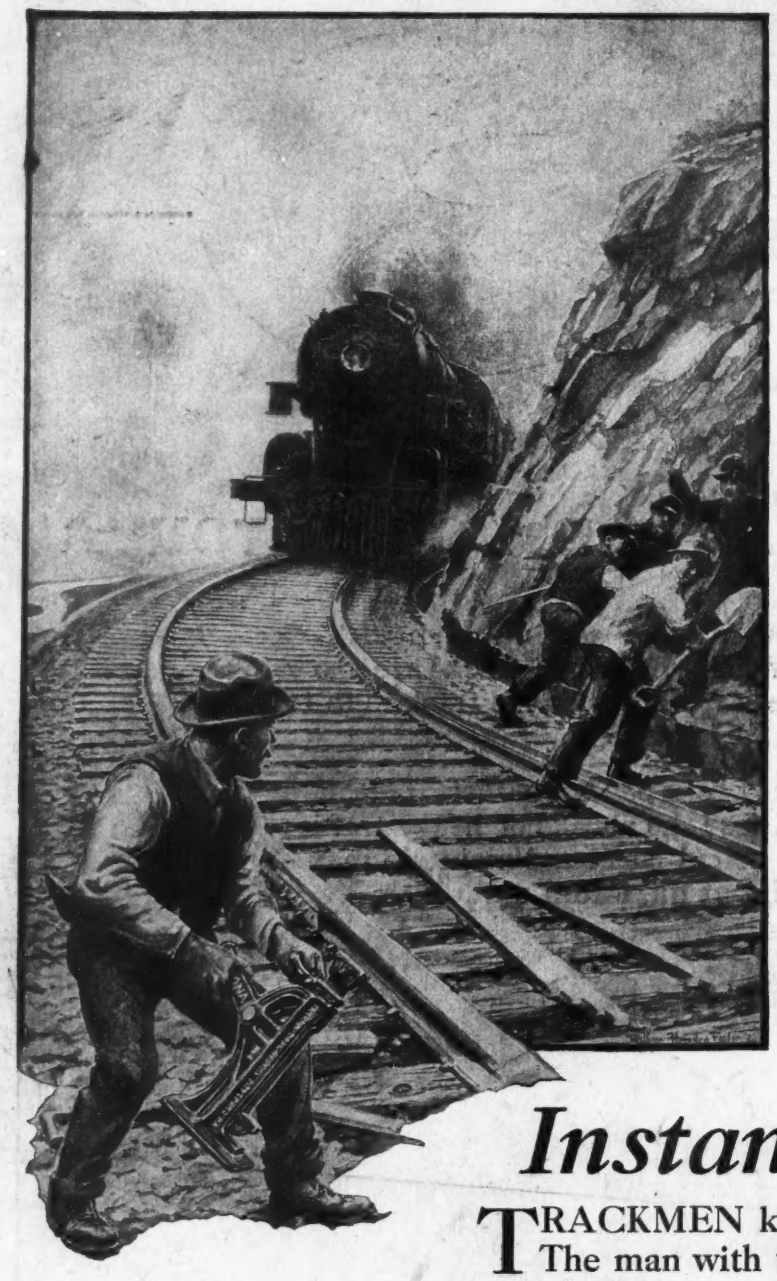
Established 1886

NEWARK, N. J.

New York
Nashville
Richmond

Chicago
San Francisco

Detroit
St. Louis
Denver



Instantaneous!

TRACKMEN know the value of seconds. The man with the Verona track jack has plenty of time.

He sets the trip when the track is lifted. The crew does its work, knowing the jack will hold. And then, on the approach of a train, a blow on the lever socket with a lining bar trips the jack instantaneously. The loosened jack is pulled out of danger in time.

That's all, but Verona means security—and quality. Men work better with a safe, positive jack.

Five sizes
Single and double acting
Lifting range 6 to 18 in.
All actual 15-ton capacity
Write for specifications

VERONA TOOL WORKS

New York PITTSBURGH Chicago